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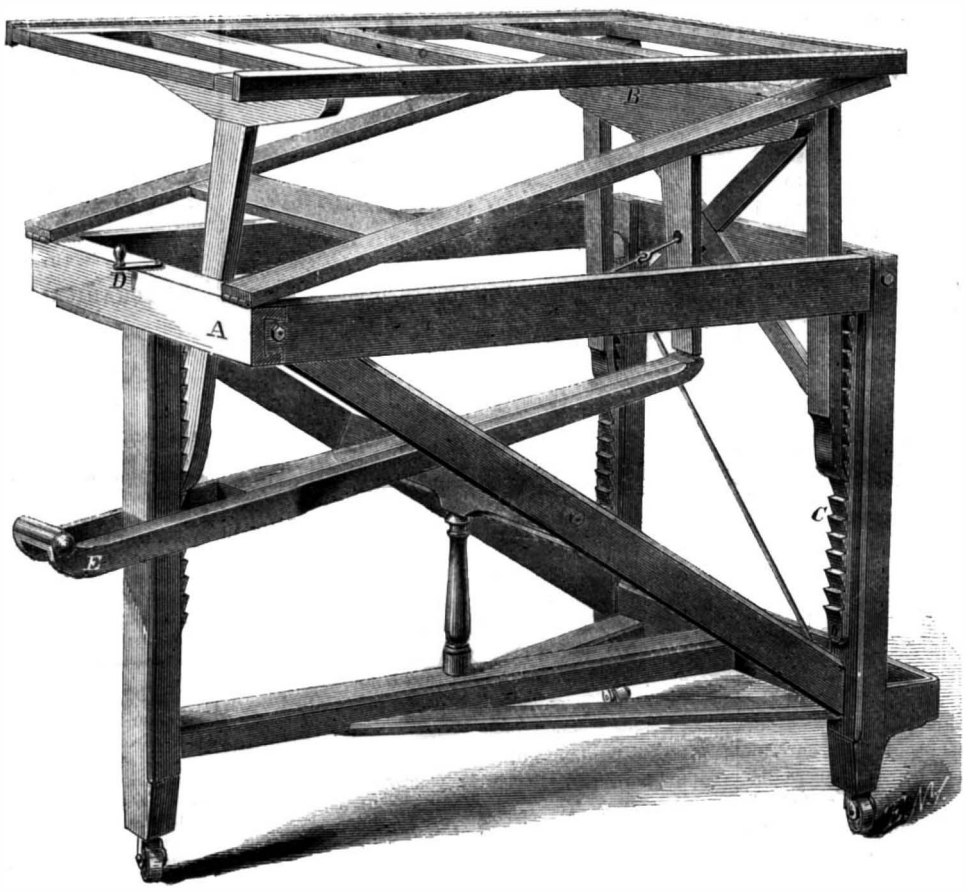
Improved Camera Stand.

Individuals who are seized with a desire to transmit their interesting countenances to posterity often purchase the distinction by an expenditure of much time and patience; besides the wear on the nerves is so great, to sensitive people, that the pictures show it, and the operator is blamed for causes, as bankrupts say, "wholly beyond his control."

We call the attention of the photographic fraternity to this improvement in stands. When they approach their victim, twist his head on one side and apply the tongs behind, which are intended to hold him rigidly immovable, they say, "put on a pleasant expression if you please," which is highly probable, with two pincers nipping one in the neck. The victim, therefore, looks anguish unutterable; and by the time the operator has reached his camera again, the pleasant expression which he imparted by twisting the neck of the patient, has wholly vanished, so that he has to go back and do his work all over again; by constant twisting and turning, the neck of the unfortunate victim gets so pliable and his brain so addled, that he resigns himself to his fate, and his face expresses such exquisite imbecility that his family indignantly disown the prototype.

The stand here shown is designed to facilitate the business of adjustment, and is conveniently arranged for its purpose, and will put an end to the sufferings we have set forth above. The inventor provides a frame, A, which has a supplementary frame, B, inside. This latter has legs or pawls which work in racks, C, on the legs of the frame, A. These pawls serve to sustain the camera in place, and the forward set are united by a cross, against which a spring bears to keep them in gear, so that they cannot become displaced accidentally. They may, at any time, be removed from the rack for purposes of adjustment by acting the knob, D. The vertical adjustment of the camera is further aided by moving the projecting lever, E, which causes the back part of the frame to be elevated. Thus all the necessary movements are provided for, and the business of the photographer will be much improved by the adoption of it. This invention was patented through the Scientific American Patent Agency on the 14th of February, 1865, by James Scouler, 830 Vallejo street, San Francisco, Cal., address him at that place for further information.



SCOULER'S CAMERA STAND.

MOBILE bay was cleared of obstructions by means of torpedoes and a galvanic battery. The topedoes were let down among the obstructions, and then exploded by means of an electric wire. About a mile of sunken barges and boats, filled with stones and old iron, were blown up in this way

How Corn is Reaped in Brazil.

A traveler writing from Brazil gives the following account of the slovenly manner in which corn is harvested there. It would seem as if a few reapers would not be amiss.

"Instead of cutting off and carting away the crop, or shocking and husking it on the field, when the grain is fit for harvesting, the whole force of the *estancia* take the field, falling upon the corn with their knives just wherever they happen to fall into the field—some in the centre, some on the skirts; some this side, some that; one cutting a dozen stalks, with which he marches off to the house, hugging them under one arm; another, making up a respectable bundle, poises it upon his head, and bears it away. A third one, lashing together with his lasso fifty or so of the stalks, by the butts, starts off houseward, dragging his bundle along the ground, tearing off leaves and husks, and very likely shelling off quite one half the corn from the cob.

"The fourth harvester does something better. He makes up two respectable bundles, and slinging them over a mule, he trudges off to the house, supplying himself, at a single jaunt, with a day's work at stripping the ears; while others are continually coming and going, and cutting and husking. Thus is the labor continued until the crop is harvested."

Failure of the Ames Gun.

We learn from the Boston *Advertiser* that three more of the Ames heavy guns were tested in the same manner as the first, by firing ten rounds from each gun, with a charge of 25 pounds of powder and a 125-pound shot. The third gun was blown apart at the first round, in precisely the same manner as the one which exploded at the trial of the first eleven guns. The breech, including the vent and six inches in length of the cannon, was blown off in one solid mass, showing, as before, an imperfect weld.

Preservation of the Remains of Extinct Species.

The following extract is from the highly interesting work of "Huxley on the Origin of Species":—

"Almost all the hard parts of animals—the bones and so on—are composed chiefly of phosphate of lime and carbonate of lime. Some years ago I had to make an inquiry into the nature of some very curious fossils sent to me from the north of Scotland. Fossils are usually hard bony structures that have become imbedded in the way I have described, and have gradually acquired the nature and solidity of the body with which they are associated; but in this case I had a series of *holes* in some pieces of rock, and nothing else. Those holes, however, had a certain definite shape about them, and when I got a skillful workman to mak castings of the interior of these holes, I found that they were the impressions of the joints of a back bone and of the armor of a great reptile, twelve or more feet long. This great beast had died and got buried in the sand, the sand had gradually hardened over the bones, but remained porous. Water had trickled through it, and that water being probably charged with a superfluity of carbonic acid, had dissolved all the phosphate and carbonate of lime. and the bones themselves had thus decayed and entirely disappeared; but as the sandstone happened to have consolidated by that time, the precise shape of the bones was retained. If that sandstone had remained soft a little longer, we should have known nothing whatsoever of the existence of the reptile whose bones it had incased.

How certain it is that a vast number of animals which have existed at one period on this earth have entirely perished, and left no trace whatever of their forms may be proved to you by other considerations. There are large tracts of sandstone in various parts of the world, in which nobody has yet found anything but footsteps. Not a bone of any description, but an enormous number of traces of footsteps There is no question about them. There is a whole valley in Connecticut covered with these footsteps, and not a single fragment of the animals which made them have yet been found. Let me mention another case while upon that matter, which is even more surprising than those to which I have yet referred. There is a limestone formation near Oxford, at a place called Stonesfield, which has yielded the remains of certain very interesting mammalian animals, and up to this time, if I recollect rightly, there have been found seven specimens of its lower jaws; and not a bit of any

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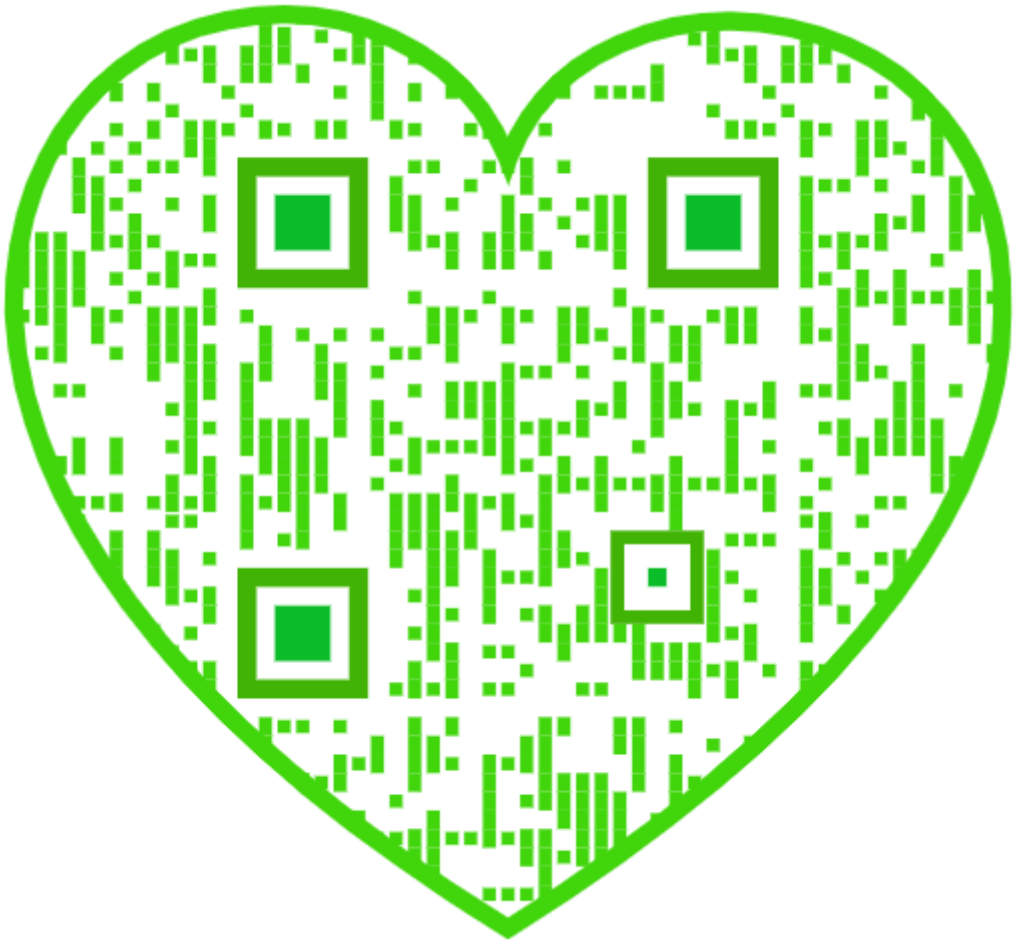

thing else, neither limb bones nor skull, or any part whatever; not a fragment of the whole system! Of course, it would be preposterous to imagine that the beasts had nothing else but a lower jaw! The probability is, as Dr. Buckland showed, as the result of his observations on dead dogs in the River Thames, that the lower jaw, not being secured by very firm ligaments to the bones of the head, and being a weighty affair, would easily be knocked off, or might drop away from the body as it floated in water in a state of decomposition. The jaw would thus be deposited immediately, while the rest of the body would float and drift away altogether, ultimately reaching the sea, and perhaps becoming destroyed. The jaw becomes covered up and preserved in the river silt, and thus it comes that we have such a curious circumstance as that of the lower jaws in the Stonesfield slates. So that, you see, faulty as these layers of stone in the earth's crust are, defective as they necessarily are as a record, the account of contemporaneous vital phenomena presented by them is, by the necessity of the case, infinitely more defective and fragmentary."

FRENCH CHEMISTS ON AUSTRIAN GUN-COTTON

It will be remembered that a chemical commission, appointed by the Austrian Government to examine the gun-cotton prepared by Baron Von Lenk, reported that the article differed materially in composition and properties from that made by the usual process. As some eminent French chemists, MM. Pelouze and Maurey, have devoted a great deal of labor to the examination of gun-cotton. and extensive experiments had been made in France to test the applicability of this new material to artillery purposes, it was to be expected that these chemists, if not mortified at the better success of the Austrians, should at least, be prompted to go over their ground again, and either abandon or confirm their previous conclusions. The London *Chemical News* has a report by MM. Pelouze and Maurey of a re-examination of gun-cotton, in which they contradict the statements of Baron Von Lenk and the Austrian commission.

Cotton is almost pure cellulose, and while all chemists agree that cellulose is composed of carbon and the elements of water, there seems to be a slight difference of opinion in regard to the proportions. Some good authorities state the composition of cellulose, $C_{12}\,H_{10}\,O_{10}$, and hold that by treating it with nitric acid both the cellulose and the acid are decomposed, the nitric acid losing one element of oxygen and becoming NO_4, which displaces a portion of the hydrogen in the cellulose, and thus forms gun-cotton. The Austrian chemists have held that in Baron Von Lenk's gun-cotton three atoms of hydrogen were displaced by three of NO_4, making what they called trinitro cellulose. This would contain sufficient oxygen to effect its complete combustion, so that it would burn without the access of atmospheric air.

Other chemists have taken the view that the nitric acid is not decomposed in making gun-cotton, but that it displaces a portion of the elements of water. This seems to be the position of M. M. Pelouze and Maurey, and we infer that they take the composition of cellulose before it is acted on by nitric acid to be $C_{24}\,H_{22}\,O_{22}$. They say:—

In 1847 we determined the composition of pyroxylin, and represented it by the following formula—$C_{24}\,H_{17}\,O_{17}.5NO_5$.

We must first find out whether we operated on a product different to Lenk's pyroxylin, and if the two are chemically identical, whether this formula is correct.

We have conducted these researches with the greatest possible care, and believe we have surmounted the difficulties of the combustion of pyroxylin. We found the pyroxylin of Hirtenberg and Bouchet chemically identical, and found for them a formula differing from the previous one by only one equivalent of water.

This formula is $C_{24}H_{18}O_{18}.5NO$.

It is so like the previous formula—$C_{24}H_{17}O_{17}.5NO_5$—that analysis alone would not be sufficient to justify the alteration without being supported by the amount of the yield. In fact, the new formula supposes a yield of 177·78 of pyroxylin for 100 of cotton, while the old formula corresponds to a yield of only 175. The direct experiments described above gave the figure 178.

All the gun-cottons we analyzed were previously washed in a mixture of alcohol and ether, to remove some milliemes of fatty and soluble matters, then dried for several hours in a stove at a temperature between 40 and 50°.

All were of the composition above described, and gave the following figures :—

Carbon	25·00
Hydrogen	3·13
Oxygen	59·72
Nitrogen	12·15
Total	100·00

The Action of Heat on Pyroxylin.—General Lenk ascribes the unsatisfactory results obtained in France by the Commission of 1846 to the fact that not sufficient attention was paid to the manner in which the pyroxylin was prepared, and to operating upon an insufficiently defined nitred product. By taking advantage of conditions most favorable to nitrogenization, he believes he has obtained a pyroxylin very difficult to decompose.

We will not discuss the theoretical value of this assertion, which does not seem to us to be very great. It is, on the contrary, more probable that gun-cotton would decompose more readily the less like cellulose, and, consequently, the more nitred it became. However this may be, General Lenk says that pyroxylin made by his process will not explode below 136° C.

We have made this important point the subject of numerous experiments.

These experiments were first made with an experimental matrass, open or closed, and plunged into a bath of boiling water.

All the samples heated in this way to 100° were sooner or later decomposed, and in a few minutes a disengagement of nitrous vapors took place.

The decomposition takes place in different ways, and cannot be reproduced at will. Four methods of decomposition at 100°, having the common characteristic of the disengagement of nitrous vapors, may be given:—

1. The pyroxylin detonates violently.

2. It decomposes without detonating, leaving a white, pulverulent, acid residue, partially soluble in water, containing no nitrogen, and forming about half the weight of the pyroxylin.

3. It leaves a yellow, amorphous, inexplosible residue, partially soluble in water, and reducing, like glucose, the double tartrate of copper and potash.

4. It gives a small residue (only 8 to 10 per cent of its weight), and a black matter, in appearance like charcoal. In this case the matrass is entirely covered with a yellow powder, which dissolves in alkali with considerable disengagement of ammonia (this matter is apparently ulmate of ammonia). From this solution acids precipitate a dirty yellow body, also soluble in alkalis. The charcoal-like residue disengages ammonia under the action of potash. This production of ammonia by the simple action of heat from a matter formed of nitric acid and cellulose is very remarkable.

Other experiments made on various pyroxylin at 90° and then at 80° gave exactly the same results, except that decomposition took place after several hours instead of a few minutes.

At 60°, and even at 55°, pyroxylin is still decomposed. After a few days the matrass becomes full of dense reddish vapors, and the same non-nitrogenized pulverulent residue of which we have already spoken is obtained. No combustion was observed in these latter experiments.

They conclude further from experiments that Baron Von Lenk's gun-cotton decomposes at ordinary temperatures, that it has no more propulsive power than that tested in France, and finally that the objections to its employment in warfare are conclusive.

Detection of Burglars.

We take the following from the London *Builder:*—

"Allow me to suggest a contrivance for the better security of property, and by which a burglar might be detected at his work. A common gas lamp, provided with a red shade, similar to those used on the railways, should be suspended in the street in front of the bank or shop, where valuable articles are kept; the red shade should be held up above the lamp by a magnet, worked by a small battery, situate at any convenient place on the premises; the wire from the battery to the magnet should pass through the safe, doors, and drawers containing valuable articles; and as long as the connection is complete between the battery and the magnet, the red shade would be held up in its place above the lamp, showing a white light; but as soon as the connection was broken by opening any of the doors or cases, the magnet would immediately lose its power, and allow the shade to fall in front of the lamp, thus showing a red light, and giving notice to any one in the street that something was wrong inside; and when once the shade had fallen, it could not be replaced by the burglar. These magnets are very simple, being made of a piece of soft iron, bent in the form of a horse-shoe, with a coil of copper wire round the ends; and the cost of working the battery would be a trifle."

A Metal Harder than Steel.

Dr. O. E. Prieger, of Bonne, in Rhenish Prussia, has for some little time past been practising on a great scale a cheap and simple method of producing alloys of manganese and iron and manganese and copper, containing considerable proportions of manganese. Alloys of manganese and iron he calls "ferro-manganese," and alloys of manganese and copper "cupro-manganese." To produce ferro-manganese he mixes oxide of manganese in powder with powdered charcoal and malleable iron, the latter being either granulated or pulverized cast iron, or else either malleable iron or steel in the form of filings, turnings, borings, or the like. The quantity of charcoal in the mixture should be equivalent to the quantity of oxygen in the oxide of manganese, and the quantity of iron in accordance with the proportion of that metal required in the particular alloy it is desired to produce. The triple mixture is placed in crucibles, preferably of graphite, holding from thirty to forty pounds each, and covered with a layer of carbon, fluoride of calcium, common salt, or any other substance capable of preserving the mixture, when heated, from the action of the air. The crucibles are then exposed for several hours to a white heat, and on their being cooled there is found at the bottom of them a homogeneous alloy of manganese and iron. Were a mixture simply of oxide of manganese and carbon similarly treated, the oxide would be reduced by the carbon, just as when iron is present, but the liberated particles of metallic manganese would not fuse together into one mass. Some of them would combine with the silicon of whatever silicious matter, if any, were contained in the mixture, and the others, combined with more or less carbon, would be found, on cooling the crucible in which the mixture had been heated, in the form of exceedingly fine powder, and on exposure to the air would very rapidly be re-converted into oxide. When, however, metallic iron is present in a mixture of carbon and oxide of manganese exposed to a heat at which the latter can be reduced by the former. the iron seizes the particles of metallic manganese as they are set free, and prevents them from combining with more than a trace of carbon, or with more than a very minute quantity of silicon, if that body be present, and at an alloy of iron and manganese containing scarcely any appreciable admixture of any foreign substance collects in one mass, of uniform composition throughout. By this means, alloys of manganese and iron containing almost any desired proportion of manganese may be produced with ease. The particular alloys of these metals which Dr. Prieger considers most likely to be of use in the arts are two which contain their constituents in atomic proportions, one of them consisting of two atoms of manganese and one of iron, and the other of four atoms of manganese and one of iron. The proportions of manganese contained in these alloys are 66·3 and 79·7 per cent, respectively. Both these alloys are harder that the hardest steel, and take an exquisite polish, their color being between that of steel and of silver. They fuse at a red heat, and are well adapted for casting. Exposure to the atmosphere does not in the least oxidize them, and even exposure to water oxidizes them only at the surface. In this non-liability to oxidise they differ remarkably from unalloyed manganese, which is oxidized by exposure to air but little less readily than potassium and sodium, and which decomposes water with great rapidity, at all temperatures—combining with its oxygen and setting its hydrogen free.

The method of producing cupro manganese differs

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from that of producing ferro-manganese only in metallic copper, instead of metallic iron, being added to the mixture of oxide of manganese and carbon. If, instead of copper, an alloy of copper and some other metal be used, an alloy of cupro-manganese with that metal will be obtained. The varieties of cupro-manganese resemble those of bronze, but are much harder and more tenacious. The alloys of cupro-manganese with zinc are readily fusible, possess great tenacity, work very easily, and are of a color and luster approaching those of fine silver. These and other alloys of cupro-manganese, and also the varieties of cupro-manganese itself, promise to be very useful for artistic purposes. As regards ferro-manganese, what Dr. Prieger seems to value it most highly for is the ready means which it affords of adding definite quantities of manganese to ordinary iron and steel. He makes some very remarkable statements respecting the advantages which he has found to result from the addition to these metals of proportions of ferro-manganese varying from one-tenth per cent to five per cent. Should these statements be borne out by the experience of others, ferro-manganese will come largely into demand for the purpose indicated. In any case, uses of some kind are certain to be found for it. Meanwhile, we may congratulate Dr. Prieger on having virtually introduced a new metal into commerce—for metallic manganese has hitherto been obtained only in exceedingly minute quantities, at a cost exceeding that of gold, whereas Dr. Prieger has already produced some hundreds of tuns of an alloy containing eighty per cent of it at a cost of not more than about ninepence a pound.

INVISIBLE RADIATION OF THE ELECTRIC LIGHT.

It is well known that the sunbeam is composed of three elements—light, heat and the chemical or actinic rays. When the sunbeam is passed through a triangular prism it is bent from its straight track, the several parts of the light rays being bent in different degrees—the red rays the least, then the orange, yellow, green, blue, indigo, and, lastly, the violet the most. The heat rays are bent less than those of light, and the actinic more, so that in the solar spectrum the hottest part is in the dark portion below the red, while chemical effects are produced in the dark portion at the other end, beyond the violet.

Dark heat differs in some of its properties from heat that is accompanied by light; for instance, it has less power of passing through certain bodies. Plate glass an inch in thickness transmits 39 per cent of the heat coming from a naked flame, and only six per cent of that radiating from a surface of copper at a temperature of 750°. But rock-salt, while it transmits a larger portion of the heat striking upon it than any other substance, has the peculiar property of permitting the passage of the same proportion of the heat coming from all substances and at all temperatures. In measuring the dark rays of the spectrum, therefore, prisms and lenses of rock-salt are employed.

John Tyndall, F.R.S., has been making a series of observations on the spectrum of the electric light, to ascertain whether it has the same properties in these respects as the solar spectrum, and has given the results in the following paper read before the Royal Society:—

"Pending the preparation of my complete memoir, which may occupy me for some time to come, I would ask permission of the Royal Society to lay before the fellows a brief and partial summary of the results of my experiments on the invisble radiation of the electric light.

"The distribution of heat in the spectrum of the electric light was examined by means of the linear thermo-electric pile, applied to the solar spectrum by Melloni, Franz Muller, and others. The electric spectrum was formed by lenses and prisms of pure rock-salt, its width being equal to the length of the row of elements forming the pile. The latter, standing at right angles to the length of the spectrum, was caused to pass through its various colors in succession, and to search the spaces beyond the region of color in both directions.

"As in the case of the solar spectrum, the heat was found to augment from the violet to the red, while the maximum heating effect was observed beyond the red, and at a distance from the red, in one direction, equal to that of the green of the spectrum in the other.

"The augmentation of temperature beyond the red in the case of the electric light is sudden and enormous. Plotting from a datum line the thermal intensity of the various portions of the spectrum, the ordinates suddenly increase in length beyond the red, reach a maximum, and then fall somewhat more suddenly on the other side. When the ends of the ordinates are united, the curve beyond the red rises in a steep and massive peak, which quite dwarfs the luminous portion of the spectrum.

"The comparative hight and steepness of this peak are much greater than those obtained by Prof. Muller for the solar spectrum. Aqueous vapor acts powerfully upon the invisible rays, and, doubtless, the action of this substance in our atmosphere has toned down the eminence beyond the red in Professor Muller's diagram. A solar spectrum, produced beyond the limits of the atmosphere, would probably exhibit as steep a peak as that of the electric light.

"In the experiments now to be referred to, the rays from the electric light were converged by a small concave mirror. The glass mirror silvered at the back, which usually accompanies the camera of Duboscq's electric lamp, was one of the first employed. It was brought so near the electric light as to cast an image of the coal-points five or six inches in advance of the light. A solution of iodine in bisulphide of carbon, contained in a rock-salt cell, was then placed in front of the lamp: the light was thereby cut off, but the focus of dark rays remained, and various effects of combustion and incandescence were obtained at the focus. A mirror four inches in diameter, and silvered in front, will enable an experimenter to obtain most, if not all, the results now to be mentioned. I also employ a mirror eight inches in diameter, and having a focal length of eight inches, with excellent effect.

"It is not necessary to inclose the opaque solution in a rock-salt cell. The vessel intended for a solution of alum, which usually accompanies the lamp of Duboscq, and the sides of which are of glass, answers admirably. It is not, however, quite deep enough for the several tests to which I have subjected it, and in crucial experiments I employ a deeper vessel with rock-salt sides.

"With the eight-inch mirror just referred to behind the electric light, the opaque solution in front, and the focus of invisible rays about six inches distant from the electric light, the following effects have been obtained:—

1. Wood, painted black, when brought into the dark focus, emits copious volumes of smoke, and is soon kindled at the two spots on which the images of the two coal-points fall.

2. A piece of brown paper placed near the focus soon shows a burning surface, which spreads over a considerable space, the paper finally bursting into flame.

3. Black paper brought into the focus is immediately inflamed.

4. The wood of a hat box similarly placed is rapidly burnt through, and usually bursts into flame.

5. The end of a cigar, placed at the dark focus, is instantly ignited.

6. Disks of charred paper, placed in the focus, are raised to brilliant incandescence, surfaces of considerable extent being brought to a vivid glow. Charcoal is also ignited.

7. A piece of charcoal, suspended in a receiver of oxygen, is ignited in the dark focus and caused to burn brilliantly, the rays after crossing the glass of the receiver being still sufficiently powerful to heat the coal up to incandescence.

8. A mixture of oxygen and hydrogen is exploded in the dark focus by the ignition of its envelope.

9. A piece of zinc-foil, blackened on one side to diminish reflection, is pierced and inflamed. By gradually drawing the strip, once inflamed, across the focus, it may be kept blazing for a considerable length of time. This is a particularly beautiful experiment.

10. Magnesium wire, presented suitably to the focus, burns with its intensely luminous flame.

"In all these cases the effect was due, in part, to chemical action; this, however, may be excluded.

11. A plate of any refractory metal, sufficiently thin, and with its reflective power suitably diminished, is raised to incandescence in the dark focus. Gold, silver, copper, aluminum, and platinum have been thus rendered incandescent.

12. Platinized platinum shows the effect best; in a thin leaf it may be rendered white-hot, and on it is depicted an incandescent image of the coal-points. When the points are drawn apart, or caused to approach each other, their incandescent images conform to their motion.

"The assemblage of phenomena here described, and others to be referred to in my complete memoirs, may, I think, be properly expressed by the term "calorescence." This word involves no hypothesis, and it harmonizes well with the term fluorescence, now universally employed with reference to the more refrangible end of the spectrum."

A Powerful Locomotive.

The dimensions of a locomotive, designed by Mr. Jones, which has performed remarkably well, are thus given by the *Railway Times*:—

"A train of seven passenger coaches were drawn from Schenectady to Albany, a distance of 17 miles, in 23 minutes, running time, the fire not having been stoked during the passage over the road.

"I will here give some of the princpal dimensions of this locomotive. Fire surface of fire-box, 98·5 feet; fire surface of flues, 920 feet; diameter of cylinders, 15 in.; stroke, 26 in.; diameter of drivers, 5 feet 8 inches.

"The most peculiar feature of this engine is the manner in which the grates are constructed and operated, so that they cannot 'choke up' by cinder or clinker, as is the case with most other coal burners.

"Mr. Jones has devoted a great deal of his time to the careful study of the principles which govern the use of coal fuel as applied to locomotives, and has succeeded admirably in many very satisfactory experiments which have been adopted from time to time."

Action of the Air on Vegetable Fatty Oils.

It may be asked under what form the carbon and hydrogen are eliminated in the course of the oxidation of oils. I agree with Saussure, that a portion of the carbon passes to the state of carbonic acid, but I have, moreover, ascertained that the amount of carbonic acid produced does not nearly represent the whole of the carbon which has disappeared.

In the same way with hydrogen, part is disengaged as water, but it is also eliminated under some other form.

These facts are easily explained by the production of a carbonized volatile compound, the pungent odor of which greatly resembles that of acrolein; this is a substance which browns the sheets of unsized paper, serving to recover the oils exposed to the air.

Some old books are colored in the same way, and I believe that this coloration is the result of the slow oxidation of the oil used in the printing ink, and the formation of a product possessing a stifling odor, similar to that which I have recognized in air which has been for about ten days in contact with a siccativeoil.—M. S. Gloeg, in the *Chemical News*.

Pittsburgh Machine Shops.

There are twenty-four machine shops in Pittsburgh engaged in and fitted for making machinery. Fourteen of these are establishments of magnitude, and eight of them at the present time especially adapted to the manufacture of the largest size marine engines. There are also twelve boiler yards capable of manufacturing any description of boilers. There are also ten establishments locally known as river blacksmith and forge shops, at which all the heavy iron work of steamboats is wrought, from the largest wrought shaft, chain cables and anchors, to the smallest iron work required. Also, three very heavy establishments manufacturing nuts and washers and similar line of articles.

CONTRIVANCE FOR RETARDING RAPID EBULLITION.—Dr. Erlenmeyer finds that ebullition of solutions having a high boiling point proceeds quietly and regularly in a vessel surrounded with asbestos tolerably short in the fiber. The asbestos is kept in its position by bending a piece of wire gauze to the shape of the vessel. In evaporating liquids, which are apt to boil in a fitful manner, and in performing fractional distillation, "this asbestos bath" has been found most useful.

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Interesting Experiments.

Mr. William Loughbridge, of No. 362 North Eutaw street, Baltimore, is engaged in prosecuting a series of experiments "for testing the laws of friction as they relate practically to rolling stock on railways," and, in the course of them, has developed some incidental facts which are curious and interesting. The laws governing the friction of different bodies have, as Mr. Loughbridge knows and acknowledges in his circular, been definitely settled by Morin and Coulomb. It is not proposed to controvert these broadly, but to observe more particulary the action of the friction brake on wheels of cars, with a view to the adoption of the best one for the purpose.

We extract a portion of Mr. Loughbridge's circular, which is worthy of attention:—

"I have commenced making experiments on the effect of friction on 'rolling stock,' and find them very interesting and profitable, resulting in developments which with all my former experience are new to me.

"I have tested the Dynamometer one trip to Harrisburg and return, and find that by it many of the laws of friction, as it relates practically to pulling and retarding trains, can be fully and clearly demonstrated. Its capacity is ten thousand pounds, and it can be used in pulling and backing the train. I first put it between the two last cars of eight composing the train, when it fully and clearly indicated the effect of any degree of pressure on the brakes and the power required to pull the car.

"The finger of the indicator vibrates very much when running, showing great irregularity in the tractive power, or that the lateral impingement of the wheels against the rails occasioned intermittent friction. I then put the indicator between the baggage car and the tender, when the power required to pull the train was clearly shown when running, as well as the effect of the brakes when about to stop. By this device (as well as by time and distance), 'the brake' that will show or produce the greatest retarding power or tendency to stop a train without sliding wheels can be clearly demonstrated—patents, circulars and certificates to the contrary notwithstanding.

"As I had not weighed the cars I will not give the results in this report. During the trip one of the connecting rods gave way, when the locomotive was run with one cylinder only. The irregularity of the crank was then clearly shown. In starting, when it was at right angles with the connecting rod, the indicator showed nearly the same power as when both cylinders were working, but when parallel it fell nearly back to nothing.

"When we arrived at a grade too heavy for the crippled engine, a second engine was added to the train, when the indicator showed a compromise, and that a perfect and crippled engine were at work."

SCHLEIER'S INDENTED RAIL.

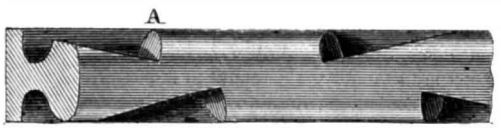
Great difficulty and loss of time are now experienced in getting the wheels of vehicles over street railroads when presented obliquely to them. When the wheels are inside of the rails they are frequently strained in crossing in consequence of the barrier which the rails oppose, and often axles are sprung and springs broken in the act of crossing rail tracks—a difficulty which is fully obviated by this invention. It consists in constructing the rails with indentations in their edges, as at A, so as to form a series of short inclined planes at both sides of each rail, thus enabling the wheels of common vehicles to release themselves from the track, or pass over it when approaching the same obliquely.

Fig. 1 represents a perspective view, and Fig. 2 a plan or top view of a portion of a rail. The rails may be of the usual or any proper form, and they are provided at each side with indentations, forming inclined planes, against which the wheels of a vehicle may catch and pass upon or over the surface of the rails. These inclined planes have an oblique position with a transverse section of the rails, and the other side of the indentations are comparatively long so as to extend gradually inward from the outer surfaces of the rails to the inner ends of the inclined planes, A. These indentations are made in the edges of the rails in reverse positions consecutively, the alternate indentations, when looking over the rails in either direction, coinciding with each other in position. By this plan the wheels of vehicles will be assisted over the rails when moving in either direction.

In Fig. 1, one of the back wheels of a vehicle is represented as passing up an inclined plane, A, from the inside of the rail. For further information, address the inventor, T. M. Schleier, Nashville, Tenn., Box 609, by whom it was patented through the Scientific American Patent Agency, Dec. 20, 1864.

Fig. 1.

Fig. 2.



EGAN'S KEROSENE OIL BURNER.

As we have frequently remarked in the columns of the Scientific American, chimneys are the one great objection to the use of kerosene oil, for when they do not crack from the intense heat, they topple off from defective fastenings, are troublesome to clean, and are in other respects a plague, as all know who have ever tried them. Inventors accordingly, with a laudable desire to help the public, and themselves also, have endeavored to dispense with the chimney, and have made some alterations in the burners to effect their object. The chimney is necessary to create a draft and confine the air inside so that it will be rarified by heat and brought in contact with the vapor of the oil, so as to obtain perfect combustion and clear white light.

Fig. 1.

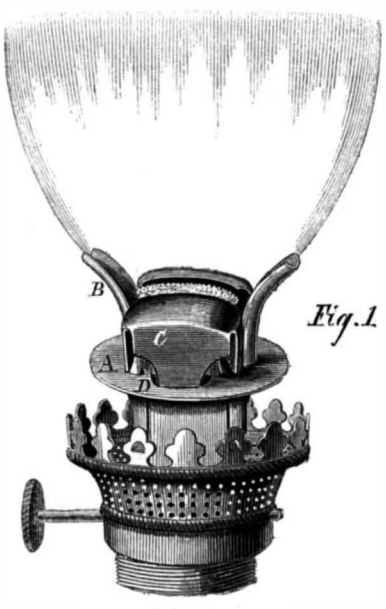
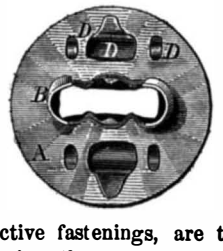


Fig. 2.



The invention here illustrated consists in providing the wick tube of a lamp with a circular plate, A. This plate has two projecting parts, B, which run up each side. On the sides of the wick are two walls of sheet metal, C, which cover apertures, D, for the supply of air to the wick. Fig. 2 shows a plan view, wherein the walls, C, are removed to disclose the air-holes, D. The air is thus forced to go directly to the flame, into which the upper currents through the openings are delivered, thus promoting combustion and performing essentially the same office as a chimney. The hight of the flame may be regulated at will as in all lamps with chimneys.

A patent was issued May 9, 1865, through the Scientific American Patent Agency, to James Egan, whom address for further information, at Zanesville, Ohio.

FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its Room at the Cooper Institute on Tuesday afternoon, May 9th, the President, N. C. Ely, Esq., in the chair.

From the several subjects discussed we select the following:—

CURIOUS AFFECTION OF HENS.

The President remarked that about a year ago the *Horticulturist* published a plan for a hen-house, with boxes for the nests, so arranged that when the fowls wished to sit the boxes could be pushed through into a separate room, where the sitting hens would be protected from the encroachments of those wishing to lay, and could be provided with an ample supply of food and water. Mr. Ely said that he had a house made exactly in accordance with the directions, and it worked admirably until some of the eggs became so advanced that the chickens in them began to peep. Then the hens upon the other nests, moved by their maternal instincts, immediately left their own nests and hovered about the peeping chicks, neglecting their own eggs and allowing them to become addled.

Professor Mapes remarked that only about fifty hens can be kept in one flock with advantage. Hens may be fenced in inclosures by making a close board fence, 5½ feet high, and stretching over this, on posts, at a hight of 15 feet, a small wire. The fowls in trying to fly out will always attempt to alight on the wire, but if it is small they will not be able to hold on upon it, and will fall back into the inclosure.

CAUSTIC SODA FOR FRUIT TREES.

Professor Mapes gave an account of a series of experiments which showed that a saturated solution of caustic soda is not injurious to the most tender living vegetable, while it dissolves all dead vegetable matter. For several years he has made extensive use of this strong solution for fruit trees, always with the best effect. It destroys great numbers of insects, and keeps the bark clean and bright. A pound to a gallon of water makes a saturated solution.

SALT AS A FERTILIZER.

Professor Mapes remarked, in the course of a discussion on this subject, that in the reign of George III., the farmers of England paid half a guinea a bushel for salt to be used as a fertilizer, and laws were passed that no turnpike should charge toll on wagons loaded with salt designed for this use. To this day these laws are in force, and even railroads are required to transport salt for manure at less than their other merchandize freight.

On the Erie canal the tolls on salt are so excessive that they are regarded by the farmers as prohibitory, and the legislature of this State could take no action better calculated to increase the prosperity, at least of all the region in proximity to the canal, than the reduction of the tolls on salt.

CURLED LEAF IN PEACH TREES.

Dr. Trimble exhibited some branches of peach trees, on which the leaves were all very much curled and blistered. He said that he had been observing them very closely, and had come to the conclusion that there are two causes of the curled leaf. One is the presence of aphides—plant lice—on the lower side of the leaf early in the season; but the lice are soon

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eaten up by the lady bugs, and the leaves recover. This blistered leaf is one of the symptoms of the disease called the yellows.

Mr. Bergen and Mr. Williams thought that the blistered leaf occurs in trees not affected with yellows.

THE WAY TO USE BONE.

The President inquired if any one could tell him the best way to apply ground bone.

Professor Mapes replied, "Let a man who knows all about the trade tell you that it is almost impossible to get any pure ground bone in this city."

Mr. Ely:—I bought mine of Peter Cooper, and he gave me his guaranty that every particle of it was pure bone; I have examined it carefully with a glass and am satisfied that it is an unadulterated article.

Professor Mapes:—I have not a doubt of it; you have cited the only exception that I could have named. Peter Cooper's treatment of bone gives a pure phosphatic result, but if our farmers used as much bone manure as they ought, Mr. Cooper could not supply one-tenth part of a single county. More than 99 per cent of the crushed bone sold in this market comes from the soap makers. They buy the bones with a good deal of meat on them, and boil them down till they are so soft that you can mash them right down with your foot. Then they mix, as they say a "little" lime with the bones so they will crush. The "little" lime is generally a good deal, and the bones contain all the gelatin, which is of no use to a farmer if he has 10,000 tuns of it. Bones prepared in this way are uncommonly rich if they contain 30 per cent of phosphate of lime.

Mr. Bergen:—You have not said how you would apply crushed bone.

Professor Mapes:—I would add to it from one-fourth to one-third its weight of agricultural sulphuric acid; which is sulphuric acid as it comes from the lead before it is concentrated. The principal expense in manufacturing sulphuric acid is in the process of concentration, and it is foolish for the farmer to pay for this when he wants it diluted. Then I would mix it with compost in order to spread it more evenly over the land. A few years ago the farmers of England were in the practice of applying what they called inch bone to the land—that is, bone in pieces an inch in diameter. They spread it at the rate of 400 bushels to the acre. At length some one suggested half-inch bone, and it was found that 250 bushels of half-inch bone would produce quite as well as 400 bushels of inch bone. Then the experiment was made of grinding it to meal, when 50 bushels proved as efficient as 400 bushels of the coarsest application. Finally Liebig showed how five bushels might be made as productive as any of the previous applications. His plan was the treatment with sulphuric acid and compost as I have described. The only difference is that while the small application is efficient for three or four years, the effects of the coarse bone applied in large quantities are observed for fifty years or more. But the interest on the cost of 400 bushels would, of course, much more than pay for five bushels once in three years.

A Sea-going Turret Ship to be Built in England.

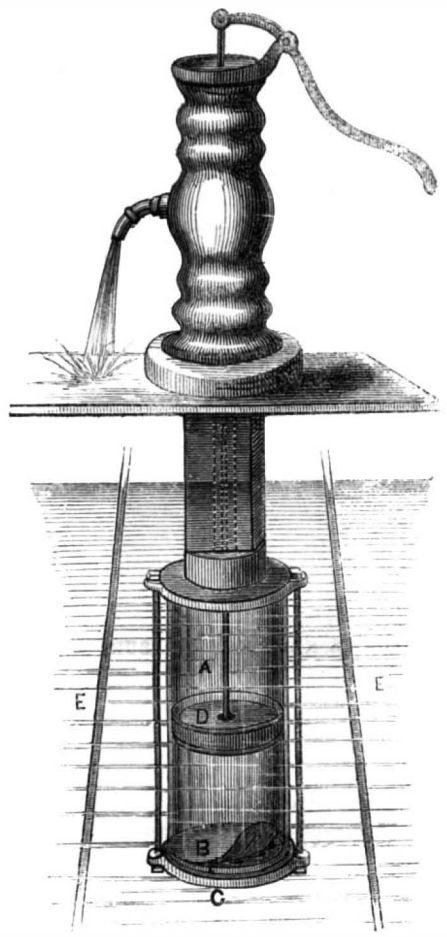
The London *Engineer* of April 28th says:—"In accordance with the instructions issued from the Admiralty to captain Cowper P. Coles, R. N., and to the Master Shipwright's Department of Portsmouth Dockyard, the chief draughtsman of the Portsmouth yard has prepared a set of drawings, under Captain Coles's supervision and direction, of a sea-going turret ship embodying Captain Coles's ideas in full of the turret principle as applicable to a sea-going ship. The vessel is designed to carry 600-pounder guns or 'Big Wills' in her turrets, and the drawings, complete in all their details, were sent in to the Admiralty by Captain Coles during the first week in the present month."

CURTAIN PINS.—In England a pin used for fastening curtain to rods, or for similar purposes, which is in appearance like a common diaper pin, with an eye in the middle of the shank or back, so that the pin may be run through the material hooked like a diaper pin, and leave a ring at the top to suspend the curtain by. The advantage is that the rings can be taken off in a minute when the curtain is washed, need no sewing, and last forever.

CARLETON'S SUBMERGED GLASS PUMP.

A good pump for domestic purposes is an exceedingly valuable thing, for being used constantly, and, by persons who are unacquainted with the care of machinery, it requires to be strongly made, free from complexity, and not liable to become deranged. The manufacturer of the pump here shown claims that all these points are obtained in his invention, and, that having been in use in a large part of Maine for some time, it has demonstrated its merits in a practical manner.

It is claimed for this pump that by constructing the cylinder of glass, corrosion is obviated, and the wear which results from this cause, as well as the injury to the water drawn, is not experienced. It is entirely submerged, and by allowing the water to be drawn off from the tube above the chamber and



below the surface, freezing of the contents of the tube never occurs, neither does the pump lose water. It is not liable to derangement from leakage, for as the pump lifts its water instead of raising it by atmospheric pressure, or "suction," as it is erroneously called, no injury beyond a slight loss of water would ensue if the tube above the chamber was cracked all the way up. Since the valves are always under water and attached without nails, they and their fastenings cannot be prematurely destroyed by the alternate action of the air and water. This pump can be used in wells of any depth, and is sold at a low price.

The construction of it is similar to all other pumps; A being the glass chamber, half an inch thick; B, the lower valve of leather, confined by being held between the valve-seat, C, and the chamber, A, and D the upper valve in the piston. All the fastenings and working parts of iron, where they are under or in water, are of galvanized iron, and in other respects the pump is strong and well made.

This invention was patented on January 7, 1862, through the Scientific American Patent Agency, and is manufactured by G. E. Carleton, at Dayton, Ohio. For further information, address him at that place.

AN arrangement has been invented in Philadelphia to prevent horse cars running over anybody. The inventor attached it to a car and then laid down on the track, and was thrust aside without injury.

IT is a remarkable fact that the late President had not a blood relation, save his two boys. Mrs. Lincoln has relatives, but her husband had none living.

RESISTANCE OF VESSELS IN WATER.

As we have had frequent inquiry of late for information of the kind conveyed below, we reprint the following article from Bourne, which will be found interesting:—

Q.—How do you determine the resistance encountered by a vessel moving in water?

A.—The resistance experienced by vessels moving in water varies as the square of the velocity of their motion, or nearly so; and the power necessary to impart an increased velocity varies nearly as the cube of such increased velocity. To double the velocity of a steam vessel, therefore, will require four times the amount of tractive force, and as that quadrupled force must act through twice the distance in the same time, an engine capable of exerting eight times the original power will be required.

[This statement supposes that there is no difference of level between the water at the bow and the water at the stern. In the experiments on the steamer *Pelican*, the resistance was found to vary, as the 2·28th power of the velocity, but the deviation from the recognized law was imputed to a difference in the level of the water at the bow and stern.]

Q.—In the case of a board moving in water in the manner of a paddle float, or in the case of moving water impinging on a stationary board, what will be the pressure produced by the impact?

A.—The pressure produced upon a flat board, by striking water at right angles to the surface of the board, will be equal to the weight of a column of water having the surface struck as a base, and for its altitude twice the hight due to the velocity with which the board moves through the water. If the board strike the water obliquely, the resistance will be less, but no very reliable law has yet been discovered to determine its amount.

Q.—Will not the resistance of a vessel in moving through the water be much less than that of a flat board of the area of the cross section.

A.—It will be very much less, as is manifest from the comparatively small area of paddle board, and the small area of the circle described by the screw, relatively with the area of the immersed midship section of the vessel. The absolute speed of a vessel, with any given amount of power, will depend very much upon her shape.

Q.—In what way is it that the shape of a vessel influences her speed, since the vessels of the same sectional area must manifestly put in motion a column of the same magnitude, and with the same velocity?

A.—A vessel will not strike the water with the same velocity when the bow lines are sharp as when they are otherwise; for a very sharp bow has the effect of enabling the vessel to move through a great distance, while the particles of water are moved aside but a small distance; or, in other words, it causes the velocity with which the water is moved to be very small relatively with the velocity of the vessel; and as the resistance increases as the square of the velocity with which the water is moved, it is conceivable enough in what way a sharp bow may diminish the resistance.

Q.—Is the whole power expended in the propulsion of a vessel consumed in moving aside the water to enable the vessel to pass?

A.—By no means; only a portion, and in well-formed vessels only a small portion of the power is thus consumed. In the majority of cases, the greater part of the power is expended in overcoming the friction of the water upon the bottom of the vessel; and the problem chiefly claiming consideration is, in what way we may diminish the friction.

Q.—Does the resistance produced by this friction increase with the velocity?

A.—It increases nearly as the square of the velocity. At two nautical miles per hour, the thrust necessary to overcome the friction varies as the 1·823 power of the velocity; and at eight nautical miles per hour, the thrust necessary to overcome the friction varies as the 1·713 power of the velocity. It is hardly proper, perhaps, to call this resistance by the name of friction; it is partly, perhaps mainly, due to the viscidity or adhesion of the water.

Q.—Perhaps at high velocities this resistance may become less?

A.—That appears very probable. It may happen that at high velocities the adhesion is overcome, so

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that the water is dragged off the vessel, and the friction thereafter follows the law which obtains in the case of solid bodies. But any such conclusion is mere speculation, since no experiments illustrative of this question have yet been made.

Q.—Will a vessel experience more resistance in moving in salt water than in moving in fresh?

A.—If the immersion be the same in both cases a vessel will experience more resistance in moving in salt water than in moving in fresh, on account of the greater density of salt water; but as the flotation is proportionably greater in the salt water the resistance will be the same with the same weight carried.

Q.—Discarding for the present the subject of friction, and looking merely to the question of bow and stern resistance, in what manner should the hull of a vessel be formed so as to make these resistances a minimum?

A.—The hull should be so formed that the water, instead of being driven away forcibly from the bow, is opened gradually, so that every particle of water may be moved aside, slowly at first and then faster, like the ball of a pendulum, until it reaches the position of the midship frame, at which point it will have come to a state of rest, and then again, like a returning pendulum, vibrate back in the same way, until it comes to rest at the stern. It is not difficult to describe mechanically the line which the water should pursue. If an endless web of paper be put into uniform motion, and a pendulum carrying a pencil or brush be hung in front of it, then such pendulum will trace on the paper the proper water line of the ship, or the line which the water should pursue in order that no power may be lost except that which is lost in friction. It is found, however, in practice, that vessels formed with water lines on this principle are not much superior to ordinary vessels in the facility with which they pass through the water: and this points to the conclusion that in ordinary vessels of good form, the amount of power consumed in overcoming the resistance due to the wave at the bow and the partial vacuity at the stern is not so great as has heretofore been supposed, and that, in fact, the main resistance is that due to the friction,

Correspondence

Red of Sorgho.

Messrs. Editors:—Some papers give, as a new discovery, the fabrication of a red coloring matter obtained from the stalks of the sorgho. This fact is not new, as the process to obtain it was described by Mr. Winter in the *Bulletin de la Societé d'Encouragement*, June, 1860, and I reproduced it in the *Industrial Chemist*, June, 1862, page 12. As it must interest many of your readers to know how to prepare it, I send you a copy of the article in question:—

"It is a fact long known that the sorgho contains a red coloring matter. The following is the process used by Mr. Winter to extract it: The trunks of the sorgho are stripped of their leaves and reduced to pulp in a rolling mill, and well pressed to extract the juice from them. This juice is used to make sugar or alcohol. The ligneous tissue is left some time to itself; it begins to ferment rapidly. Care must be taken that the fermentation is not too active, because by an elevation of temperature it will undergo putrid fermentation. When the operation has proceeded well, the mass, after fifteen days, has acquired a red or red-brown color. Stop the fermentation in drying well, and grind the matter to divide it.

"To isolate the coloring matter, infuse the powder in cold water, which dissolves a little coloring matter. Press the mass very strongly, and put it to macerate in a weak caustic lye. Filter, press and saturate the alkali by sulphuric acid; the coloring matter is separated in red flakes, which are collected on a filter, washed and dried. That color is nearly pure, very soluble in alcohol, alkalies, weak acids, etc.

"To dye wool and silk with it, use the ordinary tin mordant. The dyes made with that will resist the action of the light and a bath of soap moderately warm. The extraction and uses of that coloring matter are known and practiced in China, where the culture of the sorgho is carried on on a large scale."

Hoping this information will lead to the use of this coloring matter in industry, I remain, gentlemen, yours truly, H. Dussauce.

New Lebanon, N. Y., May 8, 1865.

Copper Cartridges Unreliable in Cold Weather.

Messrs. Editors:—My attention has been recently called to a fact which I had not previously observed, but of the truth of which I am entirely convinced, and one that constitutes a very serious objection to the fired ammunition which has come into such general use in the form of copper cartridges having the fulminate in the base. The fault I allude to is, that in cold weather they are very liable to miss fire. My conviction of this fact rests but partially on my own observation, for I have never used this ammunition in the field; and though I have experimented freely with it, my trials have been conducted in a shooting room, where a tolerably even temperature was preserved; but the testimony I have received comes to me from such varied and respectable sources that I cannot doubt its truth.

During last winter I received numerous letters from correspondents in Canada complaining of ammunition I had sent them for the Spencer, Ballard and Wesson rifles, saying that a very large proportion of the cartridges missed fire. An officer of the English army who had sent to me for a Spencer rifle and ammunition, wrote me that the gun was so much liked that he should have had orders for a number but for the defects of the ammunition, of which, on an average, one cartridge in four missed fire, and that unless I could send him some that were more reliable he would send to England and get Eley to make them for him. Similar complaints reached me from others, and puzzled me greatly, as being so contrary to my own experience, as I had found them almost invariably reliable. It is only within a few weeks that the explanation was suggested to me in a letter from a gentleman who wished me to get him a Maynard rifle, as his experience with the copper cartridges had put him out of conceit with the guns which used them. He says:—"If the temperature is many degrees below the freezing point they are entirely unreliable. I have known five or six cartridges in succession to miss fire, though taken from the same lot which, in ordinary temperature, never missed."

This opened my eyes at once to the source of the trouble my Canadian correspondents had experienced, and on communicating with them I find the statement confirmed by several who have had the opportunity of making the trial at different seasons. The most natural explanation seems to be that a change of temperature causes a condensation of the moisture in the air contained in the cartridge, which so dampens the fulminate as to destroy its explosive power. But, whatever may be the cause, the fact comes to me from so many sources and from men who could have no interest in making misstatements, that I cannot doubt it, and as it is one which interests every man who uses a gun it ought to be known. The trouble of capping is a trifling matter compared to the annoyance of continual missfires.

H. W. S. Cleveland.

Danvers, Mass., May 6, 1865.

Washing Wool with Glycerin.

Messrs. Editors:—In reading an article in No. 15, current volume, of your valuable paper, on "Applications of Glycerin," I notice that it is used by "manufacturers of woolen goods" in place of oil. As soon as I read the article I procured some from one Gasco, and tried it for oiling wool for carding. It seemed to work well, except that it gummed up the cards more than oil will do, and the cards would not clear of wool as readily as they ought. I reduced it with water but it did not seem to obviate the difficulty. Can you inform me if anything is mixed with the glycerin to make it applicable to lubricating wool? If not I fear I shall not be able to do anything with it. I was really in hopes when I read the article that the difficulty of scouring woolen goods could be obviated.

J. H. Smith.

Newark, Ohio, May 10, 1865.

[We have no knowledge on this matter further than was stated in the extract referred to. Perhaps some of our readers may give the information sought.—Eds.

Paper on Damp Walls.

Messrs. Editors:—Will you be kind enough to inform me what I can do to keep paper on damp walls. I thought of saturating good hardware or manilla paper in coal tar, and drying, and then put it on the wall, and if it dried, have the wall paper put over it. A Subscriber.

Louisville, Ky., May 3, 1865.

[Perhaps some of our correspondents can give the desired information.—Eds.

Iron Manufacturers among the Africans.

The nodules of ore are generally smelted in the forests, and brought in a lump to the smith, who by means of stone anvils and stones as sledge hammers, converts it into a long rod; and finally, by a hand vice and grease from a small pot he carries, it is tied between two posts and drawn till it becomes a thread. It is now fit, after being once heated, for being twisted nearly, with the finger and thumb, round a few hairs from the tail of a cow, or the thicker hair of a giraffe. In this state it is worn in rings ornamenting the ankles of men and women, fifteen of them costing one string of beads, value one half-penny, and fifteen copper or brass ones being double price. Iron hoes, adzes, grass hooks, small knives, pincers, etc., are all made up by the natives, in the above rude way, and this is the extent of their knowledge in iron work.—*A Walk across Africa, by Captain Grant.*

Novelty in Iron Smelting.

On Thursday, April 27, in the presence of Sir R. Brisco, Bart., Messrs. W. Galloway, Jr., W. Higgins, and others interested in iron smelting and founding, a new and very successful system of smelting was exhibited at Messrs. Woodward's, Queen Foundery, Ancoats, Manchester. The ordinary method of smelting iron is by blowing through two or more tuyeres a powerful blast of air into the cupola which has been charged with pig iron and coke. To produce the blast in the cupola exhibited on the old method, a 4-ft. fan, requiring eight horses' power, was employed. By the new method, invented by the Messrs. Woodward, that fan, and all its usual accompaniments of shafting, strapping, oil, and wear and tear have been dispensed with. The cupola shown was 2ft. 4in. diameter, and of the usual hight. At its upper portion, immediately above the part where the charge is put into the cupola, a steam pipe 1¼-in. bore, is inserted into a wrought-iron chimney, about equal in length to the depth of the cupola below. The action of the jet of steam thence projected is to create a partial vacuum below it, and, as a consequence, a strong draught of air through the mass below. The working of the furnace is described as follows:—"The fire is lighted and the charge thrown on in the usual manner, after which the door at the charging hole is closed; the steam is then turned on and admitted into the funnel. The column of steam now rushing along carries or draws with it a quantity of air from below, thus producing a partial vacuum immediately above the fuel and metal to be acted upon. All being closed at the top the only place left for the air to enter is ten openings at the bottom, through which it flows in one constant and unbroken stream, acting on all parts of the fuel alike, thus securing a general and uniform heat throughout the furnace, consequently a more perfect combustion of the fuel." It was stated that the new method saves a large quantity of coke, and that a much better kind of casting is now obtained from a common class of pig iron than could possibly have been got formerly. For smelting a tun of iron little over a cwt. of coke is required, while the bringing down of the molten metal is performed much quicker. An advantage to persons outside the works is the absence of glaring blaze and shower of fiery sparks always found in the old method. In fact a little steam issuing from the chimney top, or top of the cupola, was the only external indication that the blast furnace was at work. The extreme simplicity of this invention strikes one with wonder that so valuable a discovery had not been made long since, especially when we remember that in our locomotives a jet of steam has long been projected into the fire-box to increase combustion, and by its aid to raise steam from a pressure of 30 lbs. to one of 120 lbs. in twenty minutes. Another advantage of this invention consists in its easily allowing cupolas to be worked in situations where it is inconvenient to have

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steam engines, as on men of war, and in warfare for casting shell, etc., and in many other situations. In founderies where it is found requisite in cases of "breakdowns" to work unexpectedly late at night, this invention will be of great value, as it can be got to work within a very brief time without any engine power. A further improvement in this apparatus will shortly be completed, by means of which the upper portion of the cupola will be surrounded by a boiler, which will supply steam to the cupolas at a still further reduction on the present trifling cost. Several of the largest ironworks in Manchester are applying the invention to their present cupolas; and there is little doubt that in a few years this mode of smelting iron from the ironstone as well as from the pig will become general.—*Iron Trade Circular.*

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Hernia Truss.—This truss is a very superior one for ordinary inguinal hernia, whether by the oblique or direct descent. The pad is of an elongated, conoidal form, and is so arranged as to adapt itself most perfectly to the groin and thigh, to which it is secured by means of a soft, buckskin strap. The spring extends as far as the spine, where it is connected with a band carried round above the opposite hip, and fastened to the pad in front. The device is well suited for cavalrymen, mechanics and laborers, who are obliged to perform varied and sudden movements and contortions of the body, as it does not shift its position upon the parts. Its merits have been confirmed by reports of investigation by adepts in the medical profession. The inventor of the above is Dr. C. W. Betzel, of Philadelphia, Pa.

Illuminated Sign.—The object of this invention is to obtain a sign with transparent letters so constructed and arranged that it may be inserted in a sidewalk flush with the pavement or upper surface thereof, and be sufficiently strong to sustain the weight of persons passing over it, and admit of having a light placed under it to render the letters visible during the night. J. L. Tarbox, New Orleans, La., is the inventor.

Mouthpiece for Cigarettes and Cigars.—This invention consists in the use of short, rounded pieces of rattan or bamboo, which are purified before use by passing steam through the pores of the same. They are afterwards inserted in the ends of the cigarettes, which are filled with Killickinick or other tobacco, in the usual manner. The advantages of this mouthpiece are that it absorbs the oil of tobacco contained in the smoke, and prevents the fine particles of the tobacco from being drawn into the mouth, and it affords a clear draft, and its cooling properties are great, for the reason that the smoke is obliged to pass through so many small holes in the mouthpiece before it reaches the mouth, which tends to purify it as well as cool it. The same article is also used as a mouthpiece for cigars, which provides a firm bearing for the teeth while smoking. The advantages of cigarettes over cheap cigars are, that they last nearly as long, draw freely, and are of uniform quality. T. C. Richards, of New York city, is the inventor, and the cigarettes are manufactured by Richards & Co., of No. 97 William street, New York.

Shingle Machine.—This invention relates to a new and improved shingle machine of that class in which a circular saw is used, and it consists in having the bolt from which the shingles are cut fitted in a swinging frame, arranged in such relation with the saw, provided with a novel feed mechanism, and operated in such a manner that the shingles will be sawed from the bolt and the latter fed to the saw by an automatic arrangement throughout. Isaac N. Voris, Pescadora, Santa Cruz County, Cal., is the inventor.

Boring Wells.—This invention has for its object the boring of oil and other deep wells, and it consists, among other things, of a method of clearing the bore of the well of the debris produced by the action of the drill, by forcing water down through the drill rod, which is made hollow, and compelling it to ascend outside the rod to the surface of the earth, bringing with it the said debris from the bottom of the bore. Leonard Atwood, Norwich, Conn., is the inventor.

Fire-arms.—This invention promises to revolutionize the art of war, by placing in the ranks or in a defensible position an effective force equal to one hundred and fifty discharges per minute from each gun. From experiments made under the inspection of ordnance officers, a rate of three discharges per second was kept up, the penetration being superior to the Springfield rifle, and the range being varied from one hundred to eight hundred and fifty yards. It was conceded that one of Mr. Gatting's guns worked by two men would put a larger number of shots into an average target at four hundred yards than one hundred men. The shooting was performed under the inspection of the officers having charge of the experimental department. The barrels and locks rotate in concert and continuously, and each load is delivered as its barrel arrives at a certain point. Fixed ammunition is used, being fed to the gun from cases set into a hopper. R. J. Gatting is the inventor.

Loom.—This invention consists in the application of two endless screws gearing in wormwheels on the axles of the calendar rolls, which carry the warp threads and the finished fabric in such a manner that a positive and uniform strain is exerted on the fabric as well as on the warp threads, and no back motion is possible; also in a peculiar shedding motion, consisting of a rocking frame applied in combination with the rolls delivering the warp threads, in such a manner that by the rocking motion of said frame yarn is given to the tread at the proper intervals, and the strain exerted on the warp threads by the operation of producing the shed is materially reduced; further, in a peculiar device for producing the selvedge on both edges of the worm fabric by imparting to one or two threads, at each side of the loom, an up-and-down motion independent of the motion of the harness; also in a peculiar double stop-motion, consisting of a rockshaft which extends across the loom in front of the batten and which is provided with two hooks, one at either end, to operate in combination with an oscillating dog and with the belt shipper, in such a manner that when the weft thread breaks or gives out at either end of the shuttle race the oscillating dog engages with the tail of one of the hooks on the rockshaft and the belt is changed; but if the weft thread is intact in its place, the hooks by coming in contact with the same turn the rockshaft and the oscillating dog produces no change in the position of the belt. Wm. Tunstell, assignor to T. H. Conklin, No. 33 Courtland street, New York, is the inventor.

Improved Governor.—This invention consists in the use of two semicircular springs hinged to the top of the governor spindles, in combination with three balls, two of which, with the governor balls, are secured to the springs on opposite sides of the spindle, whereas the third ball or weight is connected to the lower ends of both springs, and also to the rising and falling rod, which connects with the throttle valve in such a manner that when the speed of the engine rises beyond a certain point, the gravity of the middle ball or weight and the force of the springs are overcome by the centrifugal force of the governor balls, and the valve is partially or wholly closed; and as the speed of the engine slackens, the gravity of the weight and the force of the springs cause the governor valves to recede and the valves open. The governor balls are secured to the springs by means of screw rods, so that they can be adjusted closer to or further from the center of rotation and the governor can be adapted for different speeds without changing its driving pulley. F. S. LaFrance, of Elmira, N. Y., is the inventor.

Sewing Machine.—This invention relates to certain improvements in that class of sewing machines which are used to sew on the soles to boots and shoes, and the mechanism is arranged to imitate the operation of sewing on the soles to turned round shoes, or to such shoes which are turned inside out in order to sew the soles to the upper. A curved hook needle inserted into a suitable head is made to pierce the sole and upper, which are secured to the last and held in the proper position by an adjustable gage. The last is adjustable on a movable platform, which is arranged to receive lasts of different size, and an adjustable feeder feeds the work along and determines the length of the stitches. The stitch is produced by the combined action of the hooked needle, of a looper which works side by side with the needle, and catches and retains each loop, until the needle with a new loop has passed through, and of a curved oscillating thread-guide, which delivers the thread at suitable intervals to the hooked needle. The stitch is drawn up tight as the needle recedes, and during the time the needle moves forward, and the thread is relieved from all strain, the feed takes place, which would be impracticable during the time the thread is subjected to a strain, or while the needle recedes. M. J. Stein, New York city, is the inventor.

Coal at Cost.

Hunt's Merchant's Magazine contains an article on the "Coal Fever," from which we extract a part referring to coal-at-cost companies: it gives an insight into the management of them:—

One day a man came into the office of the writer—an honest hard-working letter carrier, who had proved his thrift by laying up from such a slender business, a little sum of $200. He came to ask about one of these companies—whether he would better invest his $200 in ten shares of the stock, and so be insured an annual perpetuity of ten tuns of coal at cost. "Why do you think of it?" asked I.

"Because you fellows are making three or four dollars a tun out of me on coal."

"Speak for yourself, my friend—I have no interest in coal, though I know others who have. But how do you know that any one is making three or four dollars a tun out of you?"

"Because everybody says so. Didn't the ——— have an article last night saying that coal can be bought at Mauch Chunk at $3 50, and sent here for $3 50—making $7—and here," pulling out a receipt, "is Anthracite & Co.'s bill for my last at $12."

"True, and in another column of the same paper you find the notice of the 'Consumers-own-your-own-mines Company,' don't you?"

"Exactly, and as I thought you knew something about it, I just came in to ask you."

"Well," I suggested," I don't *know* that there is any connection between the two notices, and I'm sure the honest editor has no suspicion of it, but I happen to know something of the company spoken of, and advise you to turn over in your mind as you carry round your letters, the reason, if you can, why people are so anxious to sell their coal property, when they are getting five dollars a tun profit on the product."

The poor fellow scratched his head doubtfully; but suddenly a bright idea struck him.

"It is always the way with you fellows," he said—determined to class me with the capitalists—heaven send he be a prophet! "You are always keeping a fellow down. You are in the trade, and you want to keep me from getting coal cheap. I'll put into this company and try it."

"But," I replied, with missionary spirit, "suppose a time comes when coal is sold by all the dealers at considerably *less* than cost, as it will be, if they have any stock on hand when the war ends, and gold goes down—what then?"

"Well, then I won't buy my coal of my company, but get it as cheap as I can."

"But what will become of your stock, then, in a company that was 'watered' 100 per cent, and that has to sell coal under that disadvantage below cost?" Scratch.

"And then, suppose coal continues high and profitable, what is to prevent your company from passing a resolution some day that they find this supply of subscribers at cost a losing operation, and rescinding the whole arrangement?"

"But they can't do it."

"Don't trust them—that's my advice."

My friend gathered up his package of letters, smiling.

"Ah, you fellows are always down on a poor man—I believe I'll take the stock."

And so he will, and the fact may be a good enough comment on the uselessness of advising a man who has made up his mind.

On the 31st December last there were 143 Lenoirs' gas engines working in Paris, and giving every satisfaction to the users. The Paris Gas Company state that the sale of their gas has increased in consequence of the use of these engines.

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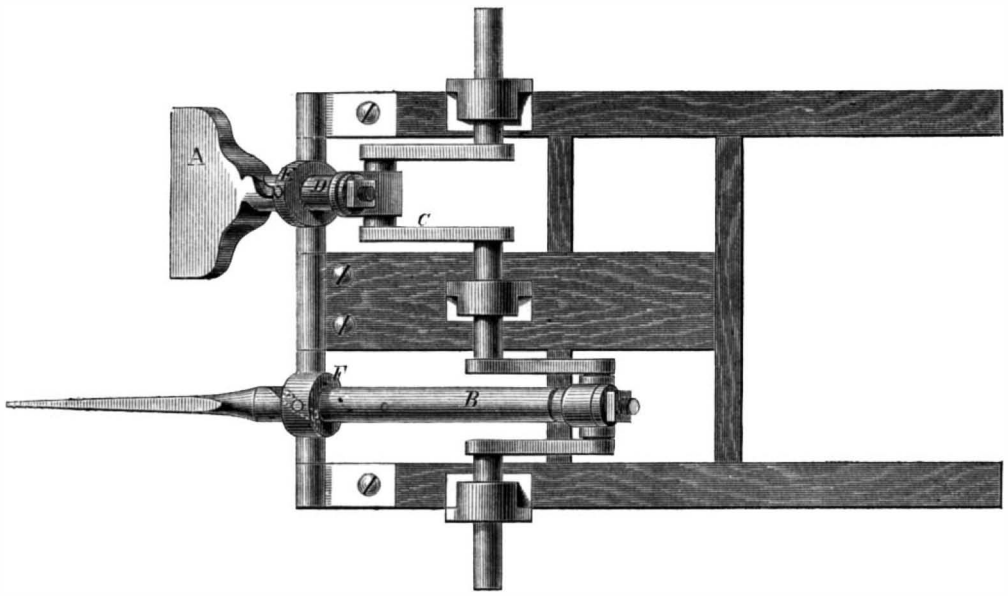
Improved Spading Machine.

This machine is intended to be attached to an ordinary wagon box or frame, and be operated from the wheels or axle of the same, so that by this attachment and an ordinary vehicle as much work can be done as with a heavier and more costly machine.

This device is so simple in its construction and action that it hardly needs a detailed description. That the reader may comprehend it clearly, however, we will state that the spades, A, which may be of any desired form, are fastened to the rods, B, and that these rods receive a thrusting motion from the crank shaft, C, which is to be driven by a pulley or gears from the wheels of the wagon. The rods, A, have slots or grooves, D, in them, in which there are pins, E; these pins have rollers, so that they work easily in the grooves.



STRATTON'S SPADING MACHINE.

The reader will observe that the groove is formed at the bottom (near the spade) into a spiral, so that when the rod, A, is forced through the stationary collar, F, on nearing the bottom the pin runs in the spiral and turns the rod, so that a twisting motion is given to the spade, such a movement, in fact, as is given by the laborer in turning up the ground. One of the spades, it will be seen, is shown turned edgeways; this is the position assumed in leaving the ground; that of entering is shown with its face forward. If deemed desirable, forks may be used instead of spades, and an attachment may be put on so as to distribute manure at the same time. This machine was patented through the Scientific American Patent Agency by Charles H. Stratton, of Towanda, Pa., Jan. 10, 1865. For further information concerning sale of rights, etc., address as above.

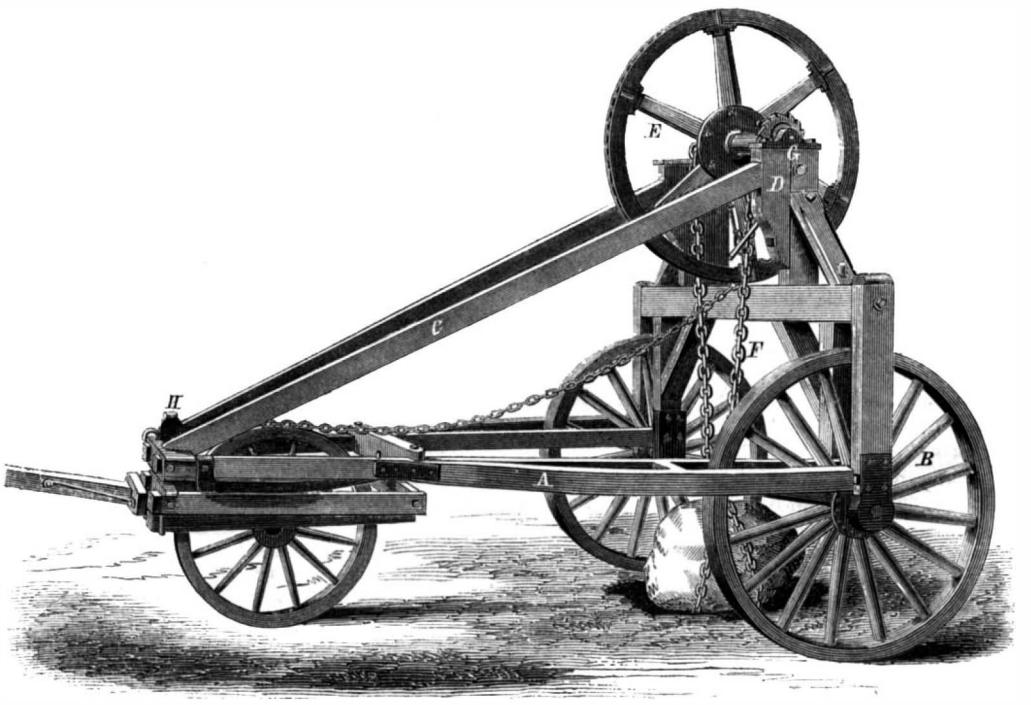
Improved Stone Lifter.

Farmers, road-contractors and others will appreciate the stone-lifting truck herewith engraved, for it is so simple in its construction, and withal so efficient, that rocks of great size and weight, which could not be moved on a "stone boat" or sledge, can be easily transported by it to any point and there thrown off. The expedition with which this can be done is one great point in its favor, for it adds very much to its utility. The appended description will enable every one to understand its construction and operation.

The truck has a strong wooden frame, A, well supported by bolts and braces, which is mounted on the wheels, B. These wheels run between the sides of the truck frame, which is so constructed as to afford a clear space in the middle to swing the stone in.

The forward end of the frame is carried on another truck with one wheel beneath, and two strong legs or braces, C, run from the truck frame to the upright, D, which carries the lifting machinery. This latter is simply a wheel and axle, E, one of the mechanical powers having a chain which is wound over the axle in opposite directions. This chain has a pulley wheel at the bottom to which is fixed a hook, which fastens in the sling around the stone to be lifted. By simply removing the team from the pole of the machine and attaching it to the chain, F, the stone is raised, and may be sustained by the pawl and ratchet, at G, while it is carried off the field to its final destination.

The peculiar feature in the forward wheel or wheels is, that by turning it or them at right angles with the other pair behind, the truck is firmly anchored without requiring any other attachment. The pulley receives the front end of the chain and guides it, at the same time obviating the necessity of using a snatch block, which takes time, and is a trouble to secure. Thus all the necessary qualities of a stone lifter are provided in this machine. An application for a patent is pending through the Scientific American Patent Agency. For further information, address Gilbert L. Sheldon, Hartsville, Mass.



SHELDON'S STONE LIFTER.

The Magnesium Light for Light-houses.

The London *Mechanics' Magazine* says:—An extensive series of experiments have recently been made in France with a view to testing the suitability of the magnesium light for light-house purposes, and for signalizing at sea. The result of these experiments appears to be that, for the applications in question, the light of burning magnesium is not only by far the most effective that we are yet acquainted with, but also the most convenient, and, even with magnesium at its present comparatively high price, by much the cheapest. The only light which in the least approaches it in power is the electric light, but, for equal apparent areas of light-giving surface, the electric arc does not give more than two-thirds as much light as a magnesium flame; and whereas the electric light requires for its production very complicated apparatus, difficult of transport, costly to work, and very liable to get out of order, all that is required for the production of the magnesium light is a supply of magnesium wire and a match to light it, while enough magnesium wire to supply a light-house for a whole night could easily be carried in a waistcoat pocket. As regards cost, M. Gaudin, of the Bureau des Longitudes, who has gone very minutely into that question, reports that, for signalizing at sea, with magnesium at thirty shillings an ounce—its price has been reduced within the last fortnight to twelve shillings an ounce—the magnesium light need cost only one penny per signal, for signals visible for twelve miles at noon-day, and for thirty-six miles at night. By means of burning magnesium, the commander of a ship at sea might illuminate the ocean on every side of him, as often as he chose per night, and at a cost of only a few shillings per time, sufficiently to enable him to see any object which at the same distance from him he could see by day, and might thus prevent any vessels which wished to elude him having any better chance of doing so at midnight than at broad noon.

ANCIENT MEXICAN ZODIAC.

Le Monteur says that M. Montholon has just caused to be executed a copy of the great Mexican zodiac which was disinterred in the foundations of the grand temple of Mexitli in 1790, and which is now deposited against the northeast wall of the cathedral. This zodiac is an enormous stone of porphyritic trap, with a base of basalt, thirteen feet in diameter, and weighing 25 tuns.

The sculpture in relief has all the finish of Mexican works. The concentric circles, the divisions and subdivisions without number, are traced with mathematical exactness. The more this sculpture is examined in detail the more there is discovered that taste for the repetition of the same forms, that spirit of order, that sentiment of symmetry which, among semi-civilized people, replaces the sense of the beautiful.

This zodiac, to which is joined a calendar, shows that the civil year of the Aztecs—solar year—was 365 days. It was divided into 18 months, of 20 days each, after which there were added 5 complementary days before commencing a new year. As among the people of Benin and the ancient Javanese, 5 days constituted their week. They had periods of 13, 52 and 404 years. Their civil day, like that of the Persians, Egyptians, Babylonians, and for the most part the people of Asia, with the exception of the Chinese, commenced at the rising of the sun. As among the Romans, it was divided into eight intervals, four of which were determined by the rising and setting of the sun and his two passages of the meridian. The comparison of the Mexican zodiac with that of Denderah cannot fail to be of great interest for science. The copy made by M. Montholon is expected soon in Paris.

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SALT AS A FERTILIZER.

From 88 to 99 per cent of the substance of all trees and other vegetables is made up of the four organic elements—oxygen, hydrogen, nitrogen and carbon; the remaining 1 to 12 per cent consists of various mineral substances. The organic portion may all be derived from air and water; the mineral matter must come wholly from the earth. When a plant is burned, the organic portion passes away in the form of gases, and the mineral matter remains as ash.

The mineral substance of plants is made up of 12 elements, which are found in the plant in combination either with each other, with oxygen, or with some metal. These elements are—

Potassium	Chlorine
Sodium	Iodine
Calcium	Sulphur
Silicium	Phosphorus
Aluminum	Iron
Magnesium	Manganese.

The proportions in which these several elements occur in plants vary widely with different plants and in different parts of the same plant; with a given part of a given plant the proportions are pretty constant, though even in this they are subject to considerable modification by the age of the plant, the season of the year, the composition of the soil, and other influences.

Two of these elements—chlorine and sodium—chemically combined, form table salt. Chlorine occurs in plants in minute traces only, but sodium forms a considerable proportion of the ash. It is usually found soda, which is a combination of sodium and oxygen. Chlorine is a green gas, extensively used for bleaching. Sodium is a metal, lighter than water. Its affinity for oxygen is so great that if thrown upon water, it decomposes the water, combining with the oxygen to form soda, and setting the hydrogen free.

Meyen and Sprengel ascertained that salt is decomposed in the leaves of plants, the chlorine being given off, and the sodium, combining instantly with oxygen to form soda, remaining in the plant. Perhaps the bleaching of cloth spread upon grass is in part due to the action of chlorine thus eliminated. This decomposition takes place only in the night.

Soda, resulting from the decomposition of salt, affects the growth of vegetation, not only by contributing its substance to build up the structure of the plant, but also in two or three less direct ways. One of these is by aiding in dissolving the mineral constituents of the soil. One of the principal ingredients in the ash of plants is silica; this mineral is abundant in nearly all soils, but it is not soluble in pure water. By the addition to water of potash or soda, its power of dissolving silica is materially increased.

Soda also exerts a powerful influence in dissolving the organic constituents of soils; it is therefore a valuable ingredient in compost heaps. In this application it may be obtained from salt, by adding quicklime to the heap, in about equal proportions with the salt.

It has been suggested that there is a third action of soda in vegetable growth—that curious and mysterious property which some bodies have of effecting a combination between other bodies without undergoing any change themselves. They perform the part of managing mammas, in making matches between others. It is supposed that salt in soda may perform this catalytic office within the tissues of the growing plant, but there is no positive proof of such action.

The influences of salt being thus various, and in part unknown, it is of course impossible for chemical science to determine whether in any given case its use would be profitable or otherwise. This can only be ascertained by experiments, carefully and intelligently conducted. But there are a few facts known which may be useful in giving direction to experiments.

Both soda and potash are found in the ashes of nearly all vegetables, but, as a general rule, soda predominates in the ashes of marine and sea-shore plants, while potash occurs in larger quantity in the ashes of land plants.

As districts in the immediate vicinity of the sea shore are watered by salt spray, the use of salt in these localities would be less likely to be beneficial than in inland situations.

From the different propotions of soda contained in the ashes of various plants, it is probable that some kinds of crops would be more benefitted by salt than others. Among those most likely to be benefitted are turnips, potatoes, clover and grasses.

Positive conclusions, however, are to be reached only by experiment, and there is perhaps no better subject for a liberal money prize from some of our agricultural societies than the best series of experiments to test the value of salt as a fertilizer.

THE LENOIR GAS ENGINE.

We have, in previous numbers of the SCIENTIFIC AMERICAN, adverted to this engine, describing its construction and general principles of action. It is now being extensively used in France, where the inventor first introduced it, and is gradually finding favor in this country, as arrangements have been made to manufacture it here. It is used with common street gas, and the boiler, which is a necessary appendage of the steam engine, is, of course, not needed. The practical utility of such machines depends solely upon their economy, and not upon the degree of ingenuity apparent in their details, and it is therefore interesting to know that this machine produces a horse-power for about twelve cents per hour, at the present rate of gas per cubic foot, which is very high. Half-horse power machines are built which run at the same rate, six cents per hour—this cannot be considered exorbitant.

A curious fact attending the introduction of this machine here is, that the heat generated by the combustion of a given quantity of gas is much higher than that given out by a similar quantity abroad. This occasioned some little mechanical difficulty, which has been remedied. These engines generally run at an average velocity of 175 revolutions per minute, and can be easily managed by any one. We look upon machines of this class as highly desirable for many purposes where steam is objectionable, and we learn that many of them are in use in different places for driving light machinery. Those interested in such things can see one of these engines in operation at the Dry Dock Iron Works, foot of Tenth street, East River, this city.

FOOT-POUNDS OF WORK.

Work is the overcoming of physical resistance, such as the crushing or breaking of bodies, the displacement of fluids, or the raising of weights. The simplest mode of measuring and expressing a given quantity of work is the raising of weights; and the raising of any body weighing one pound one foot in hight is called a foot-pound of work. The raising of 1 pound 10 feet high, or the raising of 10 pounds 1 foot high, is 10 foot-pounds of work.

It will be observed that the amount of work is entirely irrespective of the time in which it is accomplished. A foot-pound of work is the raising of 1 pound 1 foot in hight, whether one second or one hundred thousand years be occupied in the operation.

Power, on the other hand, is the energy competent to accomplish a given amount of work in a given time. A horse power is the constant force which can perform 33,000 foot-pounds of work in every minute of time.

A UNIT OF HEAT AND SPECIFIC HEAT.

In measuring the temperature of any substance or body by a thermometer, the quantity of the substance or the size of the body have no influence upon the indications; these are the same if we employ a pint of water or the whole ocean. Philosophers have, therefore, sought for some mode of measuring or expressing *quantities* of heat. The plan which has been adopted is to take as the unit of quantity of heat the amount required to raise the temperature of one pound of water one degree of Fahrenheit's scale. This is the English and American unit of heat.

The same quantity of heat that will raise the temperature of one pound of water one degree will raise the temperature of one pound of iron nine degrees, or of one pound of mercury thirty-three degrees. This different capacity of various bodies for heat is called specific heat. Water has the highest specific heat of any substance known, except hydrogen, and is taken as the standard; the specific heat of other substances being expressed in fractions. The following table is given by Prof. Silliman, most of the figures having been originally taken from the experiments of Regnault.

TABLE OF SPECIFIC HEAT—WATER—1·0000.

SOLIDS.			
Aluminum	0·2143	Platinum	0·0324
Sulphur	0·2026	Lead	0·0314
Iron	0·1138	Phosphorus	0·1887
Cobalt	0·1070	Arsenic	0·0814
Nickel	0·1086	Silver	0·0570
Copper	0·0952	Iodine	0·0541
Zinc	0·0956	Antimony	0·0508
Selenium	0·0762	Gold	0·0324
Tin	0·0562	Bismuth	0·0308
LIQUIDS.			
Mercury	0·03331	Bromine	0·11094
GASES AND VAPORS (equal weights.)			
Atmospheric Air	0·2379	Carbonic Acid	0·2164
Oxygen	0·2182	Sulphide of Carbon	0·1575
Nitrogen	0·2440	Sulphurous Acid	0·1553
Hydrogen	3·4046	Ammonia Gas	0·5080
Chlorine	0·1214	Olefiant Gas	0·3694
Bromine	0·0552	Water Vapor	0·4750
Nitrous Oxide	0·2238	Alcohol Vapor	0·4513
Nitric Oxide	0·2315	Ether Vapor	0·4810
Carbonic Oxide	0·2479	Chloroform	0·1568

A knowledge of the specific heat of substances is of value in many practical applications. For instance, on the railroad over the mountains from Italy to Austria, the cars are warmed by means of vessels of hot water, which are changed at the several stations. From its high specific heat water is peculiarly suitable for this use, as a pound of it, in cooling a given number of degrees, gives out nine times as much heat as a pound of iron, and thirty-three times as much as a pound of mercury.

CHEAP SOLVENT FOR GOLD.

It is well known that there is no single acid which will dissolve gold, but that this metal is readily soluble in a mixture in the proper proportions of nitric and muriatic acids. This mixture has long been known as *aqua regia*, royal water. It is composed of 1 part nitric acid of 32° Beaume=1·28 specific gravity, and 4 parts hydrochloric acid of 22° Beaume=1·178 specific gravity.

As the idea has been advanced of employing this liquid for extracting gold from quartz in place of the usual process of amalgamating with mercury, Professor Seely, without indorsing the plan, suggests that if any miners or mining companies wish to try it, *aqua regia* might be more cheaply prepared by using certain salts, containing one of the acids, than by employing both of the acids in their pure form.

One of these plans is to mix together a solution of salt—chloride of sodium—in water, and nitric acid. Under the action of the nitric acid both the salt and the water are decomposed; the sodium of the salt

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combines with the oxygen of the water, forming soda, and setting free the hydrogen, which combines with the chlorine of the salt forming hydrochloric acid:

$$Na\ Cl + H\ O\ NO_5 = ClH + Na\ O,\ NO_5.$$

Thus we have hydrochloric acid, and the nitric acid must be in proper proportion to form with it *aqua regia*.

Another plan is to mix together saltpeter, nitrate of potash, and hydrochloric acid. A portion of the hydrochloric acid operates to decompose the saltpeter, setting free its nitric acid, which mingles with the remaining hydrochloric acid to form *aqua regia*.

$$ClH + KO,\ NO_5 = NO_5 + ClK + HO$$

Still a third method is to mix together salt, saltpeter and sulphuric acid, water also being present. The sulphuric acid decomposes both the salt and the saltpeter, setting free nitric acid and forming hydrochloric.

$$Na\ Cl + KO,\ NO_5 + 2SO_3 + HO =$$
$$Na,\ SO_3 + KO,\ SO_3 + ClH + NO_5 + O.$$

Gold may be percipitated from a solution in *aqua regia* by sulphate of iron.

THE GAME OF CROQUET.

From illustrations and remarks in *Punch* and other English papers, during the last two or three years, we have seen that the new game of Croquet was becoming very popular in England, and it is now being introduced into this country. Ten arches, each 12 inches in hight and 10 in width, formed of iron rods three-eighths of an inch in diameter, are arranged in various ways, and the game consists in driving wooden balls through these arches in prescribed order. Each player is provided with a ball of boxwood or maple about three inches in diameter, and with a long-handled wooden mallet for knocking the ball along the ground, and sides are chose of four or less in each party.

Messrs. Hurd & Houghton, No. 401 Broadway, New York, have published an exceedingly neat little pamphlet giving full directions and rules for playing this game. The following extract will give a good idea of the graceful and sprightly style in which the work is written:—

"The popularity of Croquet is easier to account for than its origin. All of a sudden there appear upon the surface of England, and now also here and there in America, numberless little arches and stakes, while excited people armed with mallets drive colored balls through the arches and at the stakes hour after hour. Nobody knows how the game started; they only know that it is great fun. Nobody even knows why this ingenious combination should be called *Croquet* at all. In vain the Frenchman bows to the Englishman and thanks him for the game, and would he be so kind as to say what possible connection there can be between knocking the balls about in the prescribed manner, and the process of crackling, of devouring, of making a first sketch in drawing, of filching or pilfering—all of which significations the verb *croquet* enjoys? The Englishman thanks the Frenchman for the word, and can only offer still more mysterious explanation afforded by the noun *croquet*, a hard gingerbread nut. *Roquet* serves us no better, for what likeness is there between a pug-dog and that musical sound of the clacking of two balls?

"We must leave the name and origin of the game to be fought over in 'Notes and Queries;' and as for the significance of it, we wait patiently for some philosopher to expound the subtle manner in which the game sets forth the epic course of life, where each player starts like the rest, each makes the arches of triumph or affliction, each passes the critical turning stake, and each at last goes out as a dead ball, while all friends or enemies, exert or are subject to influence from one another."

SPECIAL NOTICES.

George P. Gordon, Brooklyn, N. Y., has petitioned for the extension of a patent granted to him on the 5th day of August, 1851, (reissue No. 1,021), for an improvement in printing presses.

Geo. P. Gordon, Brooklyn, N. Y., has petitioned for the extension of a patent granted to him on the 5th day of August, 1851, (reissue No. 1,022), for an improvement in printing presses.

Wm. H. Akins, Dryden, N. Y., and Jacob D. Felthousen, Michigan City, Ind., have petitioned for the extension of a patent granted to them on the 5th day of August, 1851, for an improvement in sewing machines.

Parties wishing to oppose the above extensions must appear and show cause on the 17th day of July next, at 12 o'clock, M., when the petitions will be heard.

Allen B. Wilson, Waterbury, Conn., has petitioned for the extension of a patented granted to him on the 12th day of August, 1851, (reissue N. 913), for an improvement in process of forming stitches by machinery.

Allen B. Wilson, Waterbury, Conn., has petitioned for the extension of a patented granted to him on the 12th day of August, 1851, (reissue No. 914), for an improvement in process of forming stitches by machinery.

John McAdams, Brooklyn, N. Y., has petitioned for the extension of a patent granted to him on the 12th day of August, 1851, for an improvement in machine for numbering the pages of account books.

Parties wishing to oppose the above extensions must appear and show cause on the 24th day of July next, at 12 o'clock, M., when the petitions will be heard.

Hubbard Harris, administrator of Alpha Richardson, deceased, has petitioned for the extension of a patent granted to him on the 16th day of September, 1851, for an improvement in leather-splitting machines.

Parties wishing to oppose the above extension must appear and show cause on the 28th day of August next, at 12 o'clock, M., when the petition will be heard.

Notes on New Discoveries and New Applications of Science.

In the famous Inaugural Address which he delivered before the British Association for the Advancement of Science at its meeting at Newcastle in 1863, and which first drew the attention of the general public to the possibility of the eventual exhaustion of our coal-fields, Sir William Armstrong expressed his anticipation that a time will come when the water-power which so abounds in mountainous countries will be utilized by man to a far greater extent than it has ever been as yet. "There is another source of motive power," he said, after having alluded to the agency of the sun in originating coal, "to which I am induced to refer, as exhibiting a further instance in which solar influence affords the means of obtaining mechanical effects from inanimate agents. I allude to the power of water descending from hights to which it has been lifted by the evaporative action of the sun. . . . . Alpine regions abound in falls which, with the aid of artificial works to impound the surplus water and equalize the supply, would yield thousands of horse-power; and there is at least one great river in the world which, in a single plunge, develops sufficient power to carry on all the manufacturing operations of mankind, if concentrated in its neighborhood. Industrial populations have scarcely yet extended to those regions which afford this profusion of motive power, but we may anticipate the time when these natural falls will be brought into useful operation. In that day, the heat of the sun, by raising the water to hights from which to flow in these great rapids and cascades, will become the means of economizing the precious stores of motive power which the solar energy, differently directed, accumulated at a remote period of geological history, and which, when once expended, may probably never be replaced." M. Cazal, of Paris, has just suggested a novel method of turning to practical account the sources of motive power thus referred to. We recorded, a fortnight ago, a plan for converting the mechanical force of falling water into heat; M. Cazal would convert it into electricity. He would employ the water to work magneto electric machines, and, by means of insulated wires, would convey the currents thus obtained whithersoever he required work doing, and would there transform the electricity back into mechanical force again. Among a number of plans, all based on this principle, which he has devised for the accomplishment of special objects, is one for locomotion in mountainous regions, by means of railways, the trains upon which should be propelled by eletro-magnetic engines, similar to that of MM. Bellet and de Rouvre, the currents working these engines being generated in the way just indicated. He thinks that by this method the streams with which mountain districts usually abound might be made to supply the motive power for railway locomotion in such localities, at a cost very much less than that of steam, and he is at pains to show that railways to be worked on this principle might be constructed very cheaply, since electro-magnetic motors, propelled by means of a magnetic attraction between their driving-wheels and the rails, could ascend inclines quite impracticable for steam-locomotives. The idea is at least ingenious.

Looking-glass is ordinarily "silvered" by means of an amalgam of tin. A sheet of tin-foil is spread upon a level slab, and a suitable quantity of mercury is poured evenly over it. The glass plate which is to be converted into a mirror is then slid over the layer of mercury, and then pressed down by means of heavy weights. The pressure thus applied to the glass squeezes out any excess of mercury, and causes the amalgam formed by the action of the mercury on the tin-foil to adhere firmly to the glass. This is the usual method of coating glass for mirrors, but there has latterly been coming into use a process in which silver proper is employed. This process is a chemical one, the silver being precipitated on the glass from a solution of one of its salts. For application to small mirrors, this "pure silver process," as it is called, possesses no particular advantages, being, for mirrors below a certain size, although not more costly, yet not appreciably cheaper, than the old process, but for large mirrors it is very much cheaper indeed; its cost per given area of silvered surface, being just the same in the case of a large mirror as in that of a small one, whereas the cost of the old process, per given area of surface silvered by it, increases with the size of the mirror, owing to the production of sheets of tin-foil free from flaw being much more difficult, and consequently much more costly, the larger the sheets are. A modification of the "pure silver process" is now being introduced, in which platinum is used instead of silver. It is conducted as follows:—"Chloride of platinum is dissolved in water, and a certain quantity of oil of lavender is added to the solution. The platinum immediately leaves the aqueous solution and passes to the oil, which holds it in suspension in a finely-divided state. To the oil so charged litharge and borate of lead are added, and a thin coat of this mixture is painted over the surface of the glass, which is then carried to a proper furnace. At a red heat the litharge and borate of lead are fused, and cause the adhesion of the platinum to the softened glass." In mirrors coated with platinum by this method, the platinum coating, we are told, may be placed on the outer surface of the glass, and thus the imperfections of the latter be hidden, and inferior qualities of glass be made as serviceable, for the construction of mirrors, as much more costly qualities coated at the back.

A kind of silkworm which had not been heard of in Europe until lately is being a good deal talked about in France. It was first discovered in Montevideo, and hence received the name of Bombyx Platensis, but it has since been found in many other parts of the South American continent. It feeds upon the leaves of a species of mimosa, for which the name of Mimosa Platensis has been proposed, and to the growth of which certain French gentlemen well qualified to judge of such matters believe that both Algeria and the south of France are as well suited as the regions to which it is indigenous. Careful endeavors to acclimatize it will be made both in France and in Algeria, and there seems to be little doubt that they will be successful, and lead to results of great importance to the silk manufacture. We should add that the leaves on which the new silk-worm feeds are not the only valuable product yielded by the new mimosa. From its bark, especially in hot seasons, exudes a large quantity of gum, equal in quality to the very best gum-arabic, and its seed vessels are so rich in tannin that they will doubtless, when obtainable in quantity, receive numerous important practical applications.

M. Hozeau, of Rouen, has made a series of investigations, extending over four years, upon the amount of the action exerted by the atmosphere, at different seasons, upon the iodized paper used as a test for ozone. He finds that this action is always greater in spring than in summer, in summer than in autumn, and in autumn than in winter. It is least in February, begins to increase in March, and reaches its maximum in May and June.—*Mechanics' Magazine.*

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MISCELLANEOUS SUMMARY.

ANCIENT PAPER.—Mr. Toulmin Smith, in examining a mass of rolls at the Record Office, dated 1388, made the discovery that linen paper was thus early used in England. The quality is peculiar, and is apparently an imitation of the texture of vellum. Mr. Smith, who has carefully examined the paper under the microscope, believes that he has found out the secret of its manufacture. It is as durable as vellum, and after five hundred years of very bad treatment it has proved itself to be equally valuable for the preservation of public records. This discovery raises the question as to the date of the first paper manufactured in England. —*The Reader, London.*

WATER ON COACH VARNISH.—It should be observed says a cotemporary, that the more vehicle varnish is exposed to the air, and sponged with cold water after completion and before delivery, the harder will the varnish become, and thus the more durable will be its brilliancy. It is also very desirable for new carriages to be carefully sponged with plenty of cold water immediately after being used, taking care that the surfaces are wiped nicely with a chamois leather to prevent spotting. Vehicles quickly become shabby when this caution is neglected, for the varnish remaining tender for some time is the more susceptible to injury from dirt and dust.

A NEW SUGAR CANE.—One of the U. S. officials in Japan has forwarded to the Government a specimen of sugar cane grown in that country resembling the sorghum which comes from China. It is grown from layers instead of seed. It is thought that the peculiarity of its propagation, should it prove otherwise successful, would give it an important advantage over sorghum, preventing hybridizing with millets, and consequent deterioration. A large portion of it was destroyed in the long voyage, but enough is sound and already sprouting to enable the Department, a year or two hence, to make a distribution of it.

A NEW color called "green cinnabar" is stated by a foreign cotemporary to be prepared in the following manner:—Prussian blue is dissolved in oxalic acid, chromate of potash is added to this solution, which is then precipitated with acetate of lead. The precipitate, well washed, dried, and levigated, gives a beautiful green powder. By varying the proportions of the three solutions, various shades of green may be procured. Coloride of barium or nitrate of bismuth may be used in place of sugar of lead.

THE total length of Atlantic telegraph cable made up to the close of last week, was 1,993 nautical miles, and of this quantity 1,400 have been shipped on board the hulks *Amethyst* and *Iris*, for coiling on board the *Great Eastern*, at Sheerness. The Telegraph Construction Company have announced that the *Great Eastern* steamship is now open to the inspection of visitors.

NOTICE TO SUBSCRIBERS.

The first five numbers of the present volume of the SCIENTIFIC AMERICAN being out of print, we shall commence the time of each new subscriber from the date of receipt of the order, unless the writer states specifically that he wishes such back numbers as can be furnished.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to the Office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgement of our receipt on of their funds.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired

Back Numbers and Volumes of the "Scientific American."

VOLUME IV., VII. AND VOLUME XI., (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $3 00 per volume, by mail, $3 75 which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. VOLS. I. II., III., V., VI., VIII., IX. and X., are out of print and cannot be supplied.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING MAY 9, 1865.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

47,608.—Corn Planter.—J. N. Adams, Birmingham, Iowa:

I claim the plungers, F, placed at the outer side of the wheels, B, and provided with the notches or seed cells, b, in connection with the springs, K, hoppers, G, and inclined planes or surfaces, H, all arranged to operate substantially as and for the purpose herein set forth.

[This invention relates to a new and improved corn planter of that class in which the seed-distributing apparatus is connected with or attached directly to the wheels, and it consists in a novel construction and arrangement of said seed-distributing apparatus, whereby it is believed that a very simple, efficient and desirable corn planter is obtained, and not liable to get out of repair or become deranged by use.]

47,609.—Oil-boring Apparatus.—Leonard Atwood, Norwich, Conn.:

I claim the combined pile driver and boring apparatus, when made, constructed and operated in the manner and for the purpose herein set forth.

Second, The combination of a hollow tube and drill attached thereto, through which water can be forced by any usual power, when said tube rod or drill has at its lower end slots or holes, through which the water is forced into the well, expelling therefrom the debris or detritus from the well upon the outside of the drill rod or tubes, when the same is combined with the gear wheels, C8 C5, drill rotating apparatus, F e f g, when constructed in the manner and for the purpose herein described.

Third, The movable cross-head, G, pitman rods, I, guides, G', and standards, B, in combination with the levers, J, in the manner and for the purpose herein described

Fourth, The adjustable stops, H H, in combination with the levers, J J, in the manner and for the purpose herein described.

Fifth, The hinged clamps, K K, in combination with the cross-piece, U, and drill rod, D, in and for the purpose herein described.

Sixth, The movable collar, V, in drill rod, D, and combined therewith, and with the arm, F, ratchet and pawl, g, friction roller, e, and curved plate, E, in and for the purpose herein described.

47,610.—Mode of Manufacturing Superphosphate of Lime.—Edwin P. Baugh, Philadelphia, Pa.:

I claim, First, Converting bones and other offal and guano into superphosphate of lime, by causing the same to be thoroughly mixed with an acid in a closed, or nearly closed, tank, substantially in the manner described.

Second, The combination of the spiked roller and concave, or other equivalent, disintegrating mechanism with the said tank.

47,611.—Method of Treating Manure.—Edwin P. Baugh, Philadelphia, Pa.:

I claim drying the sewage of cities, poudrette, guano, and similar substances used as fertilizers, by passing through a mass of the material to be dried the products of combustion from any adjacent fireplace.

47,612.—Trusses.—Charles William Betzell, Philadelphia, Pa.:

First, I claim the pad, a, formed with a prolongation, b, and fitting the inguinal region in such a way and having such shape that the movements of the thigh or body cannot move it from its proper position, as herein set forth.

Second, I claim the spring, d, when employed in connection with the pad, a, in the manner and for the purpose herein described and represented.

Third, I claim the strap b', extending from the prolongation of the pad between the thighs and across the gluteal muscle, and hitched or fastened to the button, c, on the spring, d, for the purpose of preventing any upward movement of the pad, substantially as set forth.

Fourth, I claim the strap or girdle, e f, occupying a position above the crest of the hip bone, extending across the abdomen, and fastened to the button, a', on the pad, a, to prevent the displacement of the pad in a downward direction, and operating in connection with the strap, b, to prevent lateral displacement.

47,613.—Coupling Shafts of Boring Tools.—Jesse N. Bolles, Baltimore, Md.:

I claim the adaptation of a safety joint to either round, square, hollow or solid boring or drilling rods (and the various tools connected therewith) for boring or drilling rods used in the construction of artesian wells, oil wells, and for other purposes, so adjusted with right and left-hand threads, or outer and inner screws of different sizes (whether right or left hand), with nipple, lock-nut and collar so as to render disconnection of the rods impossible while in operation, as herein described, or any other mode, substantially the same, which will produce the intended effect.

47,614.—Corn Planter.—William H. Boyle, Cazenovia, N. Y.:

I claim the two slides, E E, provided with the shoulders or projections, c, and acted upon by the springs, b, in connection with the drop composed of the pivoted block, I, in the slide, G, acted upon by the wheel, L, provided with an arm, i, and all arranged to operate in the manner substantially as and for the purpose set forth.

[This invention relates to a new and improved device for planting corn in hills and in check rows, and it consists in the employment or use of two slides in connection with a drop bar, operated through the medium of its own gravity or a spring and wiper wheel or cam driven from one or both wheels of the machine, whereby the corn may be dropped at equal distances apart with certainty and precision.]

47,615.—Ash Sifter.—T. W. Brown, Cambridge, Mass.:

I claim the combination of the cover, B, hinged at c, and having a downwardly projecting front, A', the sieve, E, handle, F, and back door, D, all the said parts being constructed and arranged as and for the purpose herein specified.

[This invention consists in a novel arrangement of parts in an ash sifter, whereby the sieve is inclosed in a box whose top is hinged to form a cover, the lower part of the box being made a receptacle for the fine ashes and refuse.]

47,616.—Ink Well.—F. C. Brownell, East Orange, N. J. Antedated April 24, 1865:

I claim, First, Constructing an inkstand so that its lid or pen-hole cover cannot be opened without moving both vertically and horizontally, or in two different directions, substantially as set forth.

Second, Constructing an ink well so that its lid or cover for the pen hole may be locked or unlocked by means of a key or other suitable instrument, substantially as and for the purposes specified.

Third, The use of an oval-shaped flanged ring or socket, in combination with an ink well or its cover or top, constructed so as to be fastened to or loosened from a desk by turning, substantially as specified.

Fourth, Constructing an ink well whose top or cover can be fastened to or loosened from a desk or socket by turning, with a lid or pen-hole cover so constructed that it may be used as a means of turning the same, substantially as and for the purposes set forth.

47,617.—Refrigerator.—L. D. Bunn, Morristown, N. J.:

I claim, First, A refrigerator constructed with double air-inclosing walls, and adapted for refrigerating meats and other articles, when the exterior surface of the air-inclosing double wall is covered with felt, cloth or flock, or other similar material, substantially as and for the purpose described.

Second, The arrangement of chamber, G, ice chamber, E, and a cooling apartment, F, for containing the articles to be refrigerated, substantially as specified.

47,618.—Cultivator.—Peter S. Carhart, Collamer, N. Y.:

I claim the adjustable pivoted soles or plates, D attached to two or more of the shares, B, of the cultivator, and arranged with levers, F, or their equivalents, substantially as and for the purpose specified

[This invention relates to a new and useful improvement in a cultivator, for which letters patent were granted to this inventor on June 10, 1862.]

47,619.—Boiler Furnace.—Thomas H. Clark, St. Louis, Mo.:

I claim the combination in a boiler furnace, where several boilers are arranged in the same horizontal plane, of flues, B, made concentric in their cross-section with the bottoms of the boilers, and which extend beneath the boilers in the direction of their length, and are separated from each other by ridges, A, with the transverse channels, C C, and air channels, D D E E', substantially as above described.

[This invention consists, among other things, in causing the products of combustion to be equally distributed under the boilers of furnaces, and in preventing them, where several boilers are set in the same bench or block, from passing diagonally away from the boilers most remote from the chimney, and escaping without heating such distant boilers.]

47,620.—Knitting Machine Burr.—John Clute, Cohoes, N. Y.:

First, I claim making the wings of a knitting machine burr with shoulders, d, and parallel center tongues, c, substantially as and for the purpose set forth.

Second, The combination of the shoulders, d, and parallel tongues, c, of the wings with oblique radial slots, a, and a circular groove, b, in the wheel, A, said groove being turned in the wheel either from the inside or outside, substantially as and for the purpose described.

[This invention consists in the use of wings or sinkers, provided with a parallel projection or tongue, in combination with a wheel or bush, furnished with a series of oblique radial slots and with a circular groove turned or otherwise produced in the rim of the wheel from the inside or outside in such a manner that the shoulders of the wing formed on the sides of the tongue bear against the bottom of the radial slot, and the tongue fits into the circular groove, and by these means said wing is held securely in its position, and very little solder is needed to fasten it to the wheel or bush. The wings can be punched out, and if the radial slots are cut in to the same depth precisely, no turning of the wings is required after the same have been secured in the wheel.]

47,621.—Steam Engine.—Ebenezer Danford, Geneva, Ill.:

First, I claim attaching the hemispheres (or the upper and lower chambers of other form) to the upper and lower sides of the bed-plate

Second, Placing the generator immediately over the fire, with the cylinder in immediate connection therewith, when the said generator is used as a chamber in which a portion of water is flashed into steam for the purpose described.

Third, The combination of the generator, the cylinder and the interposed slide-valve, which is actuated so as to open and close the passage, S, at the specified times, for the purpose described.

47,622.—Corn Planter.—John R. Davis, Bloomfield, Iowa:

I claim, in combination with the wheel frame, A, runner frame, B rigid tongue, D, and rigid lever, E, the lever, F, fulcrumed by the link, e, to the rigid lever, E, connected loosely at its lower end to the frame, A, by the link, f, and held at its upper end by the notched bar, G g, spring, F', and catch, f, all the said parts being constructed and arranged to operate in the manner and for the purposes herein specified.

[The object of this invention has been to produce a contrivance whereby the runners of a corn planter may be more readily adjusted to work at any required depth, and effectually held in either of the various positions to which it may be raised or lowered.]

47,623.—Pattern for Cutting Boots.—Alvah D. Drew, Dixon, Ill.:

I claim an adjustable pattern composed of two parts or plates, connected together and arranged substantially as shown, for the purposes of cutting leather for boots, in the improved or patented form or style specified,

[This invention relates to a new and useful pattern for cutting leather for boots in such a manner as to form a continuous seam and at the same time avoid the labor of crimping. This mode of cutting boots, or rather cutting the leather for boots, was patented October 13, 1863, and the object of the invention is to obtain an adjustable pattern to facilitate the cutting of leather for boots in this manner.]

47,624.—Portfolio Stand.—L. Dubernet, New York City:

I claim a portfolio stand, A, with folding side wings, c, made adjustable by spring catches and serrated segments, or their equivalents, constructed and operating substantially as and for the purpose set forth.

[This invention consists in a portfolio stand, the side wings of which can be turned down and adjusted in any desired inclination in such a manner that whenever it is desired to examine the contents of one or more of the portfolios resting on the stand, one or both wings can be turned down to a horizontal or inclined position, and the portfolio can be opened without removing it from the stand, thereby saving much labor and time, and much tear and wear to the portfolios.]

47,625.—Lamp Burner.—James P. Egan, Zanesville, Ohio:

I claim the combination of the plate, A, provided with openings, I, and an oblong opening, a, with a corrugated lip, a*, at each side of the latter; the curved or floating channels or guides, B B, and the cap, C, having openings, d, at its sides and a slot, e, in its upper or face side, all constructed and arranged to be applied to a wick tube of a lamp, to operate substantially as and for the purpose herein set forth.

[This invention consists in a burner for lamps which is attached thereto by suspending it upon the wick so as to give the air which supports the flame the same access to the wick in all adjustments of the wick.

47,626.—Cotton Gin.—William B. Emery, Albany, N. Y. Antedated May 5, 1865:

I claim fastening the ribs of the breast to slotted plates or bars, in the manner and for the purpose substantially as described.

47,627.—Steam Generator.—Robert and Henry V. Faries, Indianapolis, Ind.:

First, We claim a steam generator constructed of rings of pipes

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A, communicating with each other through transverse holes or eyes, a, in the manner and for the purpose substantially as set forth.

Second, The combination of two or more coils, A D, communicating with each other by eyes, a b', and pip , c d, substantially as and for the purpose described.

Third, The deflecting plates, f g, in combination with the coils, A D, applied and operating substantially as and for the purpose specified.

Fourth, The dove-tailed flanges, l', and frame, l, in combination with the pipes, A, and fire door, F, constructed and operating substantially as and for the purpose set forth.

[This invention relates to steam generators, the distinguishing features of which consist in its being constructed principally of circular and semicircular pieces secured together by bolts and guarded with transverse openings or eyes which form the communication between the adjacent sections of pipes and give a free passage to water and steam through the entire structure. Two or more sets of pipes are arranged one inside the other and connected at the top and bottom so that steam and water can pass freely through the entire series of pipes. Suitable slats placed on the top of the inner and outer series or coils of wires serve to deflect and equalize the heat throughout the entire boiler, and those pipes opposite the fire door are cut off and their ends closed and provided with dove-tailed flanges, so that a frame can be attached thereto to support the fire door.]

47,628.—Carriage Jack.—Reuben Fink, Batavia, Ill.:

First, I claim the lever, C, in connection with a fixed bearing or a sliding one, F, bar, D and notches, b, in the base, A, all arranged substantially as and for the purpose specified.

Second, The cord or chain, E, connected to the bar, D, and lever, C, substantially as and for the purpose set forth.

[The object of this invention is to obtain a simple and efficient jack which may be applied to the axles of either light or heavy wheel vehicles, and both to the front and back axles of the same vehicle, for the purpose of raising the axles to admit of the ready removal of the wheels and replacing the same for lubricating purposes.]

47,629.—Hemming Guide.—William Gaskill, Cincinnati, Ohio:

First, I claim the hemming guide or scroll composed of the attached inter convoluted and winged plates, A a and B b, for imparting a double tuck or fold to the edge of the stuff, substantially as set forth.

Second, The plate, A a and B a, and the central prolongation, G, frame, d, combined and operating as set forth.

47,630.—Hemming Guide.—Wm. Gaskill and George H. Knight, Cincinnati, Ohio:

First, We claim the provision at the receiving end of a hemming scroll of the abruptly shouldered axial head or knob, F, of diameter greater than that of the outer convolution of the scroll, for the automatic cross crimping of the cloth edge, in the act of entering the scroll, substantially as set forth.

Second, A hemming scroll provided, at its receiving end, with the screw threaded axial prolongation, f, having the adjustable head or knob, F, as set forth, or its equivalent.

47,631.—Battery Gun.—Richard J. Gatting, Indianapolis, Ind.:

First, I claim making the series of barrels with their appropriate locks and cartridge cavities to revolve on an axis, while the requisite motions to perform the loading directly into the rear end of the barrel, exploding, and the cartridge case retracting operations, are retained by the impingement of points on the revolving mechanism, upon fixed spirals, cams or inclined planes; these several operations being performed consecutively without stopping the rotation of the barrels, when the gun is in operation.

Second, I claim the locks, figures 12 and 13, which revolve with the barrels and breech and are operated by the cam faces and springs during their revolution.

Third, I claim the cam ring, figure 5, which is rigidly attached to the diaphragm of the stationary casing, and which by means of its cam faces controls the longitudinal reciprocating motions of the locks by means of the lugs and the impingement of the butt ends of the lock upon it, substantially as described.

Fourth, I claim the caps to be placed over the cavity in the carrier to shut of the feed, substantially as described.

47,632.—Hemmer for Sewing Machines.—Harvey Goebel, New York City:

I claim, in combination with a cone shaped scroll, the center guide, C, constructed and operated as and for the purposes specified, substantially as described.

47,633.—Apparatus for Ventilating.—Henry A. Gouge, Brooklyn, N. Y.:

First, I claim the apparatus described, when constructed to promote ventilation, with substantially the parts, operating in substantially the manner explained.

Second, the inclined plane, current controller, E, arranged substantially as and for the purposes shown.

47,634.—Apparatus for Generating Gas from Petroleum.—David M. Graham, Evansville, Ind.:

I claim, First, Heating the generating chamber, A, from the oil in the receiver, C, through an ordinary gas burner, a', for the purpose of generating gas for the continuation of heat by gas alone from the gasometer, D, through and by the same burner, substantially in the manner as herein set forth.

Second, The receiver, C, gas burner, a', and pipe, b, in combination with the generating chamber, A, whereby the same is heated by the oil, substantially in the manner and for the purpose as herein set forth.

Third, The gasometer, D, piping or tubes, c, and gas burner, a, in combination with the generating chamber, A, whereby the same is heated by gas, substantially in the manner and for the purpose as herein set forth.

Fourth, The cylindrical chamber, B, in combination with the generating chamber, A, whereby the heat is condensed and retained around the same, substantially in the manner as herein set forth.

Fifth, The gasometer, E, in combination with the generating chamber, A, whereby an additional power is given to force the gas through distributing pipes, in the manner as herein set forth.

47,635.—Horse-shoe.—Loring M. Guitean, Batavia, N. Y.:

I claim, First, A horse-shoe constructed of V-form in its transverse section, substantially as described.

Second, Constructing the shoe of two parts, A A, of V-form in their transverse section and connected by a pivot or joint to admit of the expansion of the shoe under the growth of the hoof, as set forth.

Third, The oblique nail holes, d, in combination with the transverse, V-form of the shoe and the two parts thereof, connected by a pivot or joint, substantially as specified.

[This invention consists in constructing a horse-shoe of V-form in its transverse section, so that a sharp edge will be formed all around the bottom of the shoe in order to prevent slipping and to avoid the use of calks; and having the shoe composed of two equal parts connected at their pent ends by a joint, which is at the center of the pent part of the hoof, in order to admit of the shoe expanding under the growth of the hoof, the shoe being formed with oblique holes through which the nails pass from the inner side of the shoe into the hoof, the heads of the nails being above the sharp bottom of the shoe.]

47,636.—Rotary Steam Engine.—Samuel Harris, Rochester, Mich.:

I claim, First, The combination of the arm, F, with the shaft, D, constructed and operating substantially as described.

Second, The arrangement of the arms, E E', on the shaft, D, with the cupped disc, C, its buckets and flange, C', the whole constructed and operated substantially as described.

47,637.—Seed Planter.—Martin Hayden, Rochester, Mich.:

I claim, First, The adjustable or movable bar, X, provided with the tooth, u, in combination with the pinion, G, having a vacant or absent tooth, and provided with a notched plate, H, for the purpose herein set forth.

Second, The lever, I, arranged and combined with the pinion, G, plunger rod, K, valve shaft, N, and seed cup, Q, to operate substantially as and for the purpose specified.

Third, The placing of the seed cup, Q, on an axis, e, provided at one end with a crank, i, in connection with the curved slot, j, in the bar, k, for the purpose of tilting the seed cup, as described.

Fourth, The combination of the valve, M, plunger rod, K, seed cup, Q, when arranged to operate in the manner substantially as and for the purpose set forth.

[This invention relates to a new and improved seed planter for planting seeds in hills and in check rows, and also in drills if desired.]

47,638.—Lamp Shade.—Amariah M. Hills, Hockanum, Conn.:

I claim a lamp shade, composed of paper or other suitable material, made in the form of a frustum of a cone or other approximate shape, and fitted on a horizontal metallic rim or band, which is secured to a vertical extension support, having a clamp at its lower end to fit upon the neck or socket of the lamp-burner thereof, substantially as herein set forth.

I further claim the particular manner of constructing the clamp, as herein shown and described, to wit; of a spring bent so as to form rather more than a semi-circle, and having levers or finger pieces attached for the ready adjustment of the clamp to the lamp or burner, as described.

[This invention relates to a new and improved shade or reflector for an ordinary portable lamp, to relieve the eyes from the flame, and to throw the light down upon the work or article looked upon. The object of this invention is to obtain a shade which may be readily applied to and detached from the lamp, and one which will not render the room so dark as the ordinary shades in use.]

47,639.—Harvester.—A. A. Heath, West Greenville, Pa.:

I claim, First, The combination of the collar, b, of the bevel wheel, H, pinion shaft, G G, and clutches, I I, arranged substantially as and for the purpose herein set forth.

Second, The caster wheel, C, attached to the frame, O, applied to the main frame, A, of the machine, substantially as shown, in combination with the lever, P, applied to the machine, substantially as shown, to operate in the manner as and for the purpose specified.

Third, The combination of the pitman, N, pendulous bar, X, standard, W, link, n, and sickle, y, arranged and operated as and for the purpose described.

[This invention relates to an improvement in the sickle-driving mechanism, whereby the machine is rendered capable of being readily turned and backed, and the parts rendered durable and not liable to catch the cut grass or grain as the machine is drawn along in order to perform its work. The invention also relates to an improved means for raising and lowering the fingerbar and sickle, and to an improvement in the construction and arrangement of the sickle and manner of applying the pitman thereto.]

47,640.—Washing Machine.—E. Hodgkins, Carthage, N. Y.:

I claim an oscillating tub, constructed and operated as described, in combination with radial arms, E, and fixed slats, b, and grating, a, with pivots, F F, as above set forth.

[This invention has for its object to construct a washing-machine, which can be made at a small cost, be operated with little labor, and by the use of which clothes will not be worn and injured by being rubbed between opposing surfaces.]

47,641.—Cultivator.—James Hollingsworth, Chicago, Ill.:

I claim, First, The use of spring shovel beam, which will admit of a lateral swinging movement of the shovels, substantially as described.

Second, Constructing cultivator shovel beams of wood and metal, substantially as described.

Third, The rock shaft, E, provided with loose arms, c d, and lever, E, for enabling the attendant to elevate the shovel beams singly or together, at pleasure, substantially as described.

47,642.—Mop Head.—Nelson Homes, Laona, N. Y.

I claim the screw, C, in connection with the nut, B, and sleeve, G, the latter being provided with ratchet teeth, c, and arranged on the part, f, of the screw rod with a spiral spring, H, the part, F, being provided with slots and notches to receive the spurs of the sleeve, and connected with the jaw, I, as shown, and the jaw provided with ratchet teeth, b, all arranged substantially as and for the purpose set forth.

[This invention relates to a new and improved means for moving the adjustable bar or jaw of the mop head, whereby the same may be readily moved for securing the mop in the head, and releasing it therefrom, and at the same time prevented from moving casually.]

47,643.—Lock Valve for Canal Gate.—Walter W. Jerome, Rochester, N. Y., and Lewis K. Cole, Syracuse, N. Y.:

We claim the combination and arrangement of the wheel, W, the two chains, C C', provided with screw shanks and nuts, the rod, R, and the lever, L, constructed and operating in the manner and for the purposes described.

47,644.—Horse-rake.—James D. Jones, Pittsburgh, Pa.:

I claim the arrangement of the flexible seat, g, levers, r s and t, ratchets, ll and j, adjustable set screw, n, regulating link, 5, axle, a, wheels, b and b', and teeth, l, the whole being constructed, arranged and operating substantially as and in the manner herein described and for the purpose set forth.

47,645.—Setting and Adjusting Glazier's Diamonds.—M. Kleeman, Columbus, Ohio:

I claim, First, Making the shoe adjustable on the diamond holding bar, substantially as and for the purpose described.

Second, The furrow, k, on the shoe, substantially as and for the purpose set forth.

Third, The gage, g, in combination with the pin or pins, h, projecting from the bar, b, substantially as and for the purpose described.

[This machine is intended to apply a motive power upon the piston of an engine, by means of the instantaneous generation of steam, from water injected into a generator, which communicates immediately by means of a valved opening with the cylinder in which the piston works.

47,646.—Conductor's Check Box.—Thomas W. Knox, New York City:

I claim, First, A conductor's check box, whose top, E, is perforated, as shown at f, to receive passenger's tickets, whose bottom, f, is hinged, so as to be capable of being opened; both the top, E, and bottom, F, being inclosed respectively by outer covers, B B', substantially as above described.

I also claim the springs, a a, on either side of the slot or perforation, f, in combination with the partition, D, of the cover, B, substantially as and for the purpose above described.

[This invention consists of a box to receive checks issued to passengers by officers and conductors on railroad cars and other conveyances, and which is so secured that its contents cannot be removed without exposure.]

47,647.—Harness Saddle-tree.—Adolph Koehler, Holyoke, Mass.:

I claim securing the check rein hook, G, between the seat, C, and tree, A, by means of the lug or projection, a, combined with the screw, E, as described.

I also claim, in combination with the screw, E, the screw, D, passing through the lip, b, and into the pendant projection, c, for the purpose of securing the rear part of the seat to the tree, as described.

[This invention relates to an improved saddle-tree, of that class which are constructed of cast metal, and it consists in casting the tree of such a form and securing the saddle and the hook to the same, in such a manner that a perfectly smooth surface will be obtained at the under side of the tree, and the back of the horse prevented from being injured or galled, as is more or less the case on account of projections, such as nuts, bolts, etc., extending below the under surface of the trees.]

47,648.—Governor.—T. S. LaFrance, Elmira, N. Y.:

I claim, First, The hinge joints, c, in combination with the springs, E E, spindle, C, balls, G G, and weight, F, constructed and operating substantially as and for the purpose described.

Second, The screw studs, g, or their equivalents, in combination with the balls, G G, and springs, E E, substantially as described, so that the distance of the balls from the center of rotation can be regulated at pleasure.

Third, The combination of the springs, E E, balls, G G, weight, F, and rod, f, all constructed and operating substantially as and for the purpose set forth.

47,649.—Kingsbury's Coal Stove.—Wm. E. Lane, Peekskill, N. Y.:

I claim the combination of the semi-jacket, C', with the empire heater of G. J. Kingsbury, for the purpose and in the manner substantially as set forth.

47,650.—Gas Cooking Stove.—Edwin A. Leland, New York City. Antedated April 26, 1865:

First, I claim the employment in a gas cooking stove of one or more burners, arranged directly under the oven, in combination with flues below, at the sides and on the top of the oven, substantially as herein specified.

Second, In combination with the burners under the oven, and the flues under and at the sides thereof, I claim the setting-in of the upper part of the oven, substantially as shown at d e, in Fig. 2, whereby the heat is enabled to be radiated downward on to the contents of the lower part of the oven, as herein set forth.

Third, I claim the employment of a system of burners so applied in the lower and upper parts of a gas cooking stove containing an oven that the products of combustion from the lower burner or burners pass through the upper burner or burners, and the latter is or are supplied with air through the former, substantially as herein specified.

Fourth, The arrangement of the upper burners and the partition, h, in relation to each other, and to the set-in upper partitions, d e, of the sides of the oven, substantially as herein described, whereby the products of combustion from the lower burner are caused to pass over the horizontal parts, d, of the said set-in portions, and so to produce a downward radiation of heat on the contents of the lower part of the oven, as herein set forth.

47,651.—Explosive Shell.—H. W. Libbey, Cleveland Ohio:

I claim the shell, A, having two chambers, B and C, when the side walls of the latter spring from the further and outer extremities of the former, forming a double cone-shaped chamber, constructed at the center.

47,652.—Pump.—Geo. Marshall, New York City:

I claim the combination of a perforated hollow piston, C, tubular piston rod, D, centrally perforated disk valve, F, and a pump cylinder, which is constructed with a chamber, B, beneath it, and a valve, c, leading into it, beneath the piston, substantially as described.

47,653.—Liniment.—B. Marsteller, Wolf Creek, Pa.:

I claim the within-described composition for a liniment, made in the manner set forth.

[This invention relates to a composition which has a superior healing effect on wounds or bruises caused with sharp instruments, or by blows or other means.]

47,654.—Fluid Ejector.—Robert McGrath, Philadelphia, Pa.:

I claim the reservoir for compressed air and its connecting pipe, with stop-cock attached, and the ring pierced in from, as described, at the bottom of the well.

47,655.—Cultivator.—Joseph Mills, Reading, Ill.:

I claim, First, The vertically adjustable and jointed posts, D D, and the vertically-adjustable jointed and swinging posts, E E, in combination with the rods, K, for the purpose of guiding and adjusting the shovels, substantially as described.

Second, The rotating axle, B, in combination with the jointed posts, D D E E, substantially as described.

Third, The double screw rod, F, and swinging nuts, G, in combination with the swinging posts, E E, substantially as described.

Fourth, The standard, M, in combinaton with the posts, D D E E, and the axle upon which they are mounted, substantially as described and for the purpose set forth.

47,656.—Casting Tackle Blocks.—Joseph W. Norcross, Middletown, Conn.:

I claim the within-described apparatus for forming the mold for casting the eyes of a tackle block and the eye of a hook or any other two eyes or rings together, or any equivalent means, constructed and operating substantially as herein set forth.

[The principal object of this invention is to cast the eye of a tackle block into the eye of a hook, in such a manner that the two cannot possibly be separated, neither by design nor by accident, except by cutting or splitting either of the eyes. It may, however, be applied for the purpose of casting two rings together, or for other similar purposes.]

47,657.—Canal Propeller.—N. P. Otis, Yonkers, N. Y.:

First, I claim the combination of the rack, J, wheel, I, pulleys, C E, and chairs, D, operating substantially as and for the purpose set forth.

Second, In combination with the above, I further claim mounting the shaft which carries the driving wheel or wheels in slides moving in segmental guide-ways, substantially as and for the purpose described.

Third, The flanged guide-wheel, K, in combination with the rising and falling slide, b, rack, J, and boat, A, constructed and operating substantially as and for the purpose specified.

[This invention consists in the application to a canal boat of one or two wheels mounted on the end or ends of a shaft, which has its bearings in rising and falling slides, moving in segmental guide-ways, and to which a rotary motion is imparted by an engine in the interior of the boat, in combination with a track extending on the side of the canal throughout its entire length, in such a manner that by the action of said wheel or wheels on the track the boat can be propelled with comparatively little power, and without any external power such as usually employed.]

47,658.—Mode of Fastening the Heads to Spools.—Levi N. Parks, Winchendon, Mass.:

I claim the combination and arrangement of the metallic cap, A, with the body, B, the head, C, and the gudgeon, E, of the spool, the said cap being fastened to the head and to the gudgeon and to the body, by means substantially as described.

And in combination with the body, B, head, C, metallic cap, A, and gudgeon, E, applied together as specified, I claim the metallic disk, D, arranged on the external surface of the head, and so as to receive the gudgeon, as specified.

47,659.—Animal Power.—C. M. & G. Richards, Harpersville, N. Y.:

We claim the frame, J, hung upon one or more journals, and provided with arms, d e, which constitute bearings for the shaft, I, of the treadwheel, H, to admit the adjustment of the latter, in the manner herein described.

Second, In combination with the suspended frame, J d e, we also claim the bar or lever, K, provided with friction rollers, f f, and attached to the frame, J, when used in connection with a treadwheel, H, for the purpose specified.

We further claim the mode of constructing the framing of the machine, to wit: of two metallic sides, connected by wooden reaches braced by a transverse metal bar, E, which serve as an inner bearing for the shaft, D, from which the power is taken, substantially as set forth.

[This invention relates to a new and improved animal power, intended either for a horse or a dog or other small animal. It is designed as an improvement on that class of animal powers in which an inclined treadwheel is used and has for its object simplicity and

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economy in construction and a ready adjustment of the treadwheel, as circumstances may require.]

47,660.—Cigarette.—T. C. Richards, New York City:

I claim manufacturing the mouthpieces of cigarettes of rattan or bamboo, in the manner and for the purposes described.

47,661.—Stud and Button.—Samuel S. Ritter, Philadelphia, Pa.:

I claim providing a stud and button with a spring or springs, a, and a notch or notches, b, permitting the two disks, A A, to be coupled and uncoupled at will, substantially as and for the purpose explained.

[This invention relates to a stud whose two disks are capable of being detached and connected, so that in putting it into the bosom or sleeve it will not be necessary to insert the stem or shank through the button-hole, and then apply the detached disk to the opposite side.]

47,662.—Horse Power.—E. P. Russell, Manlius, N. Y.:

I claim the combination and arrangement of the driving wheel, B, with the conical rollers, C, and the taper screw, D, when constructed, arranged and operating in the manner described, and for the purpose of forming a horse power.

47,663.—Spring.—Thomas Shaw, Philadelphia, Pa.:

I claim forming the nib under the groove, in the manner set forth, for the purpose specified.

47,664.—Flower Stand.—P. B. Sheldon, Prattsburg, N. Y. Antedated May 1, 1865:

I claim providing the bearings, b b b, of the arms and their support, D, with radial flutes and corrugations, or their equivalent, for the purpose of retaining the arms in place at any adjustment thereof, and also allowing them to turn when necessary action is applied, substantially as herein specified.

47,665.—Kiln for Burning Brick and Pottery Ware.—J. N. Stanley, Brooklyn, N. Y.:

I claim the employment in a kiln for burning brick pottery ware and like articles of a flue or flues, placed centrally, or thereabout, within the burning chamber of the kiln, and arranged in such a manner that the products of combustion from the furnaces which are placed around the lower part of the kiln will pass directly upward through the mass of bricks, pottery ware or other articles placed in said burning chamber, and thence descend through the central flue or flues down to a horizontal flue, and through the same to the smoke-stack.

I further claim a horizontal flue, E, extending to the smoke-stack, when said flue is used and made to communicate with one or more vertical or central flues in a kiln for the purpose of utilizing the heat which passes from said flues.

[The object of this invention is to economize in fuel in the burning of bricks, pottery ware, etc., and at the same time cause the whole mass of bricks or other articles placed in the kiln to be subjected to a uniform degree of heat throughout.]

47,666.—Sewing Machine.—Michael Joseph Stein, New York City:

First, Mounting the sewing mechanism upon a platform or frame which oscillates upon the driving shaft, substantially as herein set forth.

Second, The rest, R, applied in combination with the sewing mechanism, supported by the hinged platform, G, substantially as and for the purpose set forth.

Third, Giving to the needle, in addition to its usual motion for penetrating and withdrawing from the material, a slight falling and rising motion, by means substantially as herein described, or any other equivalent means, so as to depress its point while entering the material to be sewed, and raise the same when passing out of said material, for the purpose set forth.

Fourth, The hinged adjustable gage, H, applied in combination with the rest, R, and needle, n, substantially in the manner and for the purpose set forth.

Fifth, The last supporter, I, with a series of sockets, l, in combination with a sewing mechanism, constructed and operating substantially as and for the puspose set forth.

Sixth, The vertically-adjustable table, E, in combination with the last supporter, L, and with the sewing mechanism secured to a hinged platform, G, substantially as and for the purpose described.

Seventh, The combination of the hinged oscillating thread guide, t, looper, l, and needle, n, constructed and operating substantially as and for the purpose set forth.

47,667.—Drawing Frame Rolls.—J. M. Stone, North Andover, Mass.:

I claim the improvement in the construction of drawing frame and other similar rolls, substantially as specified.

47,668.—Carding Machines.—Daniel Tainter, Worcester, Mass.:

First, I claim the combination with the main frame of a machine for carding wool and cotton of a supplemental sliding frame for supporting the feed-rolls, burr and leading in cylinder, and operated by rack and pinion, as and for the purposes set forth.

Second, The combination with the sliding frame, H, of the racks, b, pinions, L, and crank shaft, d, for sliding in and out the frame, H, substantially in the manner herein described.

47,669.—Illuminated Sign.—J. L. Tarbox, New-Orleans, La.:

I claim the changable illuminated sign herein described, consisting of a grooved or rebated frame, B, glass plates, D, movable letter plates, C, and confining strip, d^a, all constructed and employed as and for the purposes specified.

47,670.—Air-tight Coal Stove.—Joseph S. Todd, Macon City, Mo.:

I claim the combination of an air-tight, sheet-iron stove, with the basket-shaped grate, and the horizontal cast-iron annular plate, g, as and for the purposes set forth.

46,671.—Hay Elevator.—E. J. Toof, Fort Madison, Iowa:

First, I claim The pivoted beam or pole, C, provided with a rope, D, in connection with and inclined guide bar, E, all being applied to a suitable framing, A, and arranged to operate in the manner substantially as and for the purpose set forth.

Second, The adjustable plate or stop, F, on the rope, D, when used in connection with the pivoted beam or pole, C, and inclosed bar, E, for the purpose specified.

Third, The short inclined plane or notch, f, at the under side of the inclined bar, E, for the purpose specified.

[This invention relates to a new and improved device for elevating articles, and is more especially designed for stacking hay and grain. The invention consists in the employment or use of a single pivoted beam or pole and a single rope applied to a framing, and all arranged in such a manner that the hay, grain or other article being raised will be elevated and deposited in the proper place by a single movement of the beam.

47,672.—Shingle Machine.—Isaac N. Voris, Pescadora, Cal.:

I claim, First, The swinging frame, D, provided with the clamp rollers, H F, arranged as shown and operated through the medium of the rack, h, on bar, R, the pinion, C, levers, S T, and the grooves, i i, in bar, R, substantially as and for the purpose set forth.

Second, The eccentric roller, J, in combination with the spring, I, sliding bar, G^a, lever, K, and fluted rollers, H F, for clamping or holding the bolt, as set forth.

47,673.—Means for Carrying and Operating the Shuttle in Sewing Machines.—James Wensley, New Brunswick, N. J.:

I claim the combination of the slide, H, pivoted traveler, I, pins, d e f, slot, M, horizontal groove, 1 and 3, and inclined groove, 2, employed in connection with the shuttle, B, supported and guided by the tongue, o, all the said parts being constructed and arranged to operate as herein specified.

[This invention consists in certain improvements in the manner of applying as well as in the mode of operating the shuttle in sewing machines, the usual race being dispensed with, and the shuttle being driven to and fro by means of a vibrating carrier or traveler, which has vertical motion to and from the shuttle during each time it traverses the machine.]

47,674.—Linchpin.—George Wright, Washington, D. C.:

First, I claim the safety or embracing arm, D.

Second, The arm, D, in combination with the pin, A, constructed and operated substantially as described for the purpose set forth.

47,675.—Cooking Apparatus.—John Zimmerman, Royalton, N. Y.:

First, I claim the combination of the inner perforated receptacle with the exterior shell or casing and the boiler, substantially as described.

Second, The general arrangement of the containing vessel, consisting of the perforated receptacle and its outer casing and the cooking utensils, as described and represented, adapted for special and characteristic purposes therein.

[This invention relates to a novel steam cooking apparatus, whereby a great variety of articles may be thoroughly cooked with unusual expedition.]

47,676.—Manufacturing of Blacking Boxes.—George W. Bentley (assignor to himself and Charles G. Hine) New York City:

First, The manufacturing of boxes or cases formed of tin or sheet metal with heads of wool or other suitable material I claim turning in at a right angle all round a portion of the metal, to form a seat or shoulder for the end of wool or other suitable material, inserted within the metal after said seat or shoulder has been formed.

Second, I claim inserting the heads of wool or other suitable material within the strips of metal previously soldered and provided with the seats as shown, and creasing the metal for the purposes described.

47,677.—Fuse for Blasting, Etc.—John S. Bickford, Tuckingmill, Great Britain, assignor to Joseph Toy, Sinsburg, Conn.:

I claim the employment in a fuse as a substitute for gunpowder of a central strand or core of gun-cotton, substantially as and for the purpose herein described.

47,678.—Washing Machine.—Henry L. Buckwater, Kimberton, Pa., assignor to himself, T. A. Buckwater, of Kimberton, Pa., and E. Price, Phœnixville, Pa.:

I claim, First, The convex roller bed, B, in connection with a reciprocating roller, C, composed of grooved slats arranged as shown, and controlled or guided in its movement by the slightly curved guides, E E, substantially as and for the purpose specified.

Second, The swivel heads or guide rollers, D, constructed and applied to the rubber and fitted on the guides, E E, substantially as and for the purpose set forth.

Third, The combination of the convex roller bed, B, reciprocating rubber, C, guides, E E, and swivel heads or guide rollers, D, all arranged to operate substantially as and for the purpose specified.

Fourth, The combination of the grooved bottom plate, B', and grooved rollers, B, with a reciprocating rubber, all being constructed and arranged to operate as herein set forth.

[This invention relates to a new and improved clothes-washing machine of that class in which a stationary bed of rollers is employed in connection with a reciprocating rubber.]

47,679.—Apparatus for Carbureting Air.—Edward Dunscomb (assignor to Wm. F. Perkins and L. L. Fuller), Boston, Mass.:

First, I claim the employment of the two air-forcing bells, filling alternately and automatically, thus supplying a constant air-blast, as hereinbefore set forth.

Second, I claim the arrangement and application of the cones and inverted cones, a a' a2, etc., placed base to base and apex to apex, with the lines of perforations, b b' (Figs. 6 and 7), alternating from center to circumference, essentially in manner and to operate as before explained.

Third, I claim the application of the air tube, E, in the generator to conduct the air through the top of the generator to the recess, T, at the bottom, to operate as before described.

Fourth, I claim the recess, T, at the bottom of the generator, making an air cushion, as before described.

Fifth, I claim taking the gas from the top of the generator through the air-bell, C, by means of an air-tight joint, made by the annular cup, O, and the inverted thimble, P, Fig. 5, substantially as herein before described.

47,680.—Lamp.—Hiram W. Hayden, Waterbury, Conn., assignor to Holmes, Booth & Hayden:

I claim making the wick tube corrugated or fluted with channels in its interior surface, substantially as and so as to operate as specified.

47,681.—Lamp.—Edward M. Lang, Westbrook, Maine, and Isaiah Gilman, Portland, Maine, assignors to themselves, Jos. L. Winslow and E. Hersey:

We claim the above-described combination, as well as the arrangement of the wick tube, E, the two cones, A B, the metallic annular conduit, C, the conductors, D D, and the supports, D'' D'', or the equivalent of the latter.

We also claim the combination of the removable jacket, F, with the two cones, A B, the ring, C, and the wick tube, arranged and connected substantially as specified.

We also claim the contraction of the mouth of the inner cone at its middle, or its expansion in opposite directions therefrom, in combination with the expansion of the mouth of the outer cone at its middle or its diminution in opposite directions therefrom, in manner substantially as represented and hereinbefore described.

47,682.—Skate.—Edgar Murray, New York City, assignor to Fred'k. Wuesthoff, Newark, N. J.:

I claim the combination of the movable runner, c, link, h, and heel screw, k, with the sliding plate, e, and clamps, f f, taking the sides of the sole of the boot, as specified.

47,483.—Saw-filing Machine.—S. P. Ochiltree and E. C. Johnson (assignor to S. P. Ochiltree, W. S. Weir, N. P. Baymount), Monmouth, Ill.:

We claim, First, The shaft, M, provided with one or more toothed plates, N N' N'', and attached to the under side of the slide, L, to which the saw clamps are secured, in connection with the pawl or arm, E', and lever, D', the latter being operated by the cam, C, or its equivalent, for the purpose of feeding the saw underneath the file, as set forth.

Second, Providing the lever, D, with an adjustable fulcrum, r, and having the pawl or arm, E', slotted longitudinally with a set screw, F', at its rear, for the purpose of regulating the movement of the pawl or arm to suit the size of the teeth of the plates of shaft, M, as described.

Third. The lever A', operated substantially as shown, with spring, B', applied to it, and connected with the rod, Y, having the plate, X, attached, for the purpose of raising the file during the backward movement of the same, and a spring keeping the file pressed down during its forward movement, as set forth.

[This invention relates to a new and improved device for filing saws, whereby the work may be done in an expeditious and perfect manner, the operation being perfectly automatic throughout, and the device being capable of filing saws with different-sized teeth.]

47,684.—Mode of Pressing Damp Clay.—John Steele, Buffalo, N. Y., assignor to Lawren C. Woodruff, Corydon Karr and himself:

I claim the mode herein described of pressing damp clay or other plastic material, to admit of the escape of the air and moisture therefrom, before the final pressure is imparted, substantially as and for the purposes described.

I also claim the method of pressing the clay for bricks, tiles, and other purposes, by applying the pressure simultaneously from two opposite directions, by means substantially as shown and for the purposes described.

I also claim ventilating the mold by means of the perforations, m m, in one of the parts thereof, which is exposed while being filled, but removed before the pressure is applied, substantially as set forth.

47,685.—Mode of Adjusting Bands on Hand-spinning Machines.—David B. Teter, Batavia Station, Iowa, assignor to himself and Samuel C. Dickinson, Van Beuren County, Iowa:

I claim the method of adjusting bands in spinning machines by means of screws and nuts, in combination with the manner of attaching the band to the pulley, T, as and for the purposes described.

47,686.—Gang Plow.—John E. Travis (assignor to himself and Elon Francisco), Greenville, Ill.:

I claim the combination of the plow frame, B, and its attached plows, with the fixed frame, A, by means of a fulcrum piece, X, or other similar hinged joint, substantially in the manner and for the purpose herein set forth.

I claim the employment of the levers, t and t', with their fulcrums, l and l', and their connecting links, e and e', and their bolt, f and f' when combined with the frame, B, substantially as and for the purposes set forth.

47,687.—Loom.—William Tunstill (assignor to Theodore H. Conkling), New York City:

I claim, First, The combination of the shaft, k, worms, g h, wheels, i j, rollers, a a' d d', rocking frame, b, arm, b2, and cam b^3, when constructed and arranged to operate as herein specified.

Second, The belts, l2 l3, and drums, l^1 in combination with the crank, l5, and the heddle cords, l4, constructed and operating substantially as and for the purpose set forth.

Third, The devices above described for effecting the stop motion, arranged substantially as and for the purpose specified.

REISSUES.

1,948.—No. 1.—Machine for Making Cartridge Cases.—Ethan Allen, Worcester, Mass. Patented Feb. 14, 1860:

I claim the mandrel which carries the cartridge shell, in combination with the die, D, which admits the same, and against which the closed end of the cartridge shell is headed, substantially as described.

Second, I claim the die, D, constructed and operating for the heading of cartridge shells, substantially as described.

1,949.—No. 2.—Machine for Making Cartridge Cases.—Ethan Allen, Worcester, Mass.—Patented Feb. 14, 1860:

I claim the sliding mandrel, which advances and supports the shell, in combination with the revolving chuck, which grips and revolves the shell against the action of the cutting tool, substantially as described.

Second, I claim the combination of the sliding and revolving mandrel, C, the revolving chuck, S, and the automatic tool, Q, substantially as described.

Third, I claim operating the cutting tool by the supplemental motion of the mandrel carrier or slide, L, as described.

1,950.—Roving Frame.—George Chatterton, Providence, R. I., assignee of Thomas Mayor, Pawtucket, R. I.:

I claim the construction and mode of arranging the bolster, with the spindle and the transverse rail, or its equivalent, substantially as described, for the purpose specified.

1,951.—Method of Preserving Wood Railroad Ties, Etc. R. S. Foreman, Morrison, Ill. Patented June 21, 1864:

I claim the application to all wood materials liable to rot or take fire, be eaten with grubs or insects, a composition made of the materials, and applied as and for the purposes herein set forth.

1,952.—Breech-loading Fire-arm.—William Cleveland Hicks, New York City. Patented March 10, 1857:

I claim, First, The combination in a breech-loading fire-arm, with an internally flanged cartridge or cartridge case, a hooked or barbed instrument, under such an arrangement in relation to an outside lever operating the breech as that by opening the breech the cartridge or its case is withdrawn from the barrel.

Second, The employment in breech-loading fire-arms of a breech-piece provided with a hooked prong or prongs, when said prongs are constructed as herein described, to perform the functions of picking the cartridge and striking the percussion primer, and of grasping and extracting the cartridge from the barrel, as set forth.

Third, The employment in breech-loading fire-arms, in which primed cartridges are used and exploded by means of the breech pin, of two or more prongs to insure the explosion of the charge, substantially as set forth.

1,953.—Machine for Making Cement Pipe.—Humphrey Holden, New Haven, Conn. Patented May 9, 1865:

I claim the employment or use in a machine for making cement pipe of a series of rolls, or their equivalents, arranged in connection with a mold; that is, a case and core, in such a manner that the cement will be gradually compressed, or compacted in the mold, from the bottom toward the upper end of the latter, substantially as and for the purpose herein set forth.

1,954.—Hay and Cotton Press.—Ira James, Mattoon, Ill. Patented Feb. 16, 1864:

I claim, First, The provision in a vertically acting beater hay press of sleeve, P, ratchet and brake movements, W and W X, and pulley and toggle movements, a S T, the whole being combined and operating substantially as set forth.

Second, The employment or use of clamps, so constructed and arranged that the hay after being compressed may be removed from the press and retained in its compacted or compressed state, and the bale bound or hooped outside of the press, substantially as set forth.

1,955.—Tanning Hides and Skins.—Simon H. Kennedy and Henry L. Elder, Philadelphia, Pa., assignees of Wm. Fields and Israel Townsend, Wilmington, Del. Patented June 7, 1864. Reissued Jan. 10, 1865:

We claim, First, The within-described method of treating hides, preparatory or during the process of tanning, by exposing them to the action of liquor of any described description, by the aid of an air-tight vat, and of gaseous fluid under pressure, introduced into said vat, so as to agitate the liquor and cause the same to act on the hides and skins with increased effect.

Second, The employment or use for the purpose of tanning hides or skins of a current of air or other gas applied to said hides or skins under a pressure of from five to twenty or more pounds to the square inch, acting in combination with the ordinary or other tanning liquors, substantially as and for the purpose set forth.

Third, The arrangement of one or more pipes extending to the interior of an air-tight vat, in combination with said vat, with a pump and loaded valve, constructed and operating substantially as and for the purpose described.

1,956.—Leather-splitting Machine.—J. A. Safford, Boston, Mass. Patented Feb. 2, 1864:

I claim, First, The spring, C, constructed and operating substantially as set forth.

Second, The spring, C, in combination with the feed roll, B, the whole being constructed and operating substantially as and for the purpose described.

Third, The knife, a, constructed with two bevels, and having the cutting edge beyond the center, of the thickness of the knife, as set forth, when combined with the feed roll, B, substantially as described.

Fourth, Making the under bevel of the knife, a, concave, to conform generally with the convex surface of the feed-roll, B, substantially as and for the purpose described.

DESIGNS.

2,055.—Top-plate and Balance-cock of a Watch.—Frederick A. Giles, New York City.

2,056.—Shoe.—A. A. Gould, Melrose, Mass.

2,057.—Clock Case.—S. B. Jerome, New Haven, Conn.

2,058.—Stove.—Benj. F. Johnson (assignor to Wager & Falls), Troy, N. Y.

2,059.—Piano Stool.—Hiram T. Merrill and John H. Brennan, Chicago, Ill.

2,060.—Clock Front.—Nicholas Muller, New York City.

2,061.—Spoon and Fork Handle.—John Polhamus, New York City.

2,062.—Group of Figures.—John Rogers, New York City.

2,063.—Trade Mark to be used on Lead Pencils.—Joseph Schedler, New York City, assignor to American Lead-pencil Company, Hudson City, N. Y.

2,064.—Coffin Handle.—Clark Strong, Chatham, Conn.

2,065.—Floor Oil-cloth.—John Taylor Webster, New York City, assignor to Edward Harley, Brooklyn, N. Y.

NOTE.—In the above list of ninety-nine patents we notice the names of FORTY-TWO inventors whose applications were made through the Scientific American Patent Agency.

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PATENTS

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In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents.

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter.

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D BISHOP.

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Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

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Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. the Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

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The engraving published herewith shows a machine for rendering hard work easy. All the labor above alluded to is avoided by the employment of simple mechanism, which can be easily seen by referring to the engraving. The arrangement consists in fixing a gang of plows, A, of any desired form, to several frames, B, which are independent of each other, and so contrived that they can be adjusted sideways in order to suit crops of different kinds that may be planted in different ways. One end—the forward one—of the frame is connected to the draught pole of the machine by suitable fixtures, and at the latter, or hinder parts, by chains to a transverse shaft, C; this shaft has a lever, D, in it, which is close to the driver's seat, and which, being grasped, enables him to elevate the plows at will whenever it is necessary to do so. They are not only lifted easier by this method, but quicker and straighter, so that they may run close up to a stone or stump, be lifted up by the side of it, and let down again opposite with but little loss of space.

It will be seen that by setting the plows under the center of the machine, and connecting them under the draught pole, they hold their furrow and never jump out or miss. When desired, the plows can be taken off and cultivators substituted.

This arrangement gives a very neat and efficient machine for the purpose. It was patented Feb. 14th, 1865, by S. H. Mitchell, of El Paso, Ill., through the Scientific American Patent Agency; for further information address him at that place.

MITCHELL'S GANG PLOW.

Fig. 1

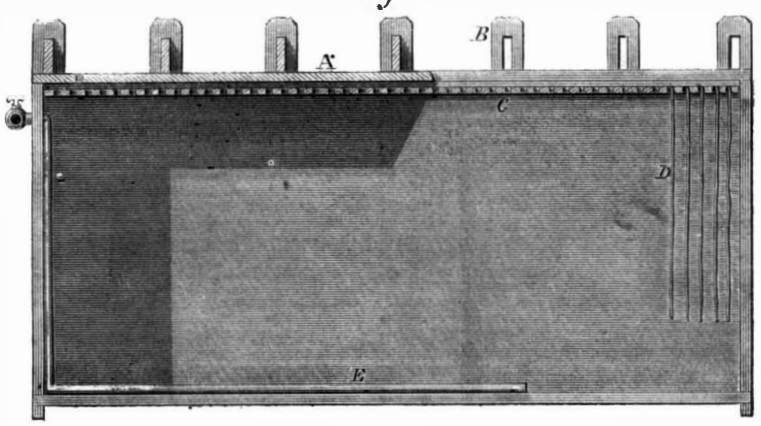
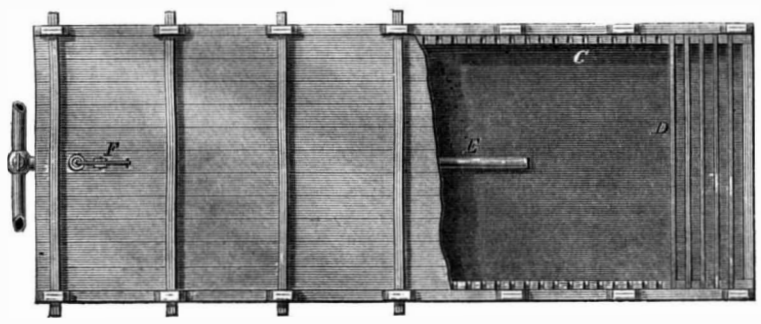


Fig. 2



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The improvement further consists in agitating the tanning liquor by a current of air or other gas under pressure, and the tank is therefore furnished with a pipe, E, through which a continuous current of air is forced at a pressure varying from 5 to 20 pounds per square inch; this causes the tanning liquor to be violently agitated, and to act on the surface and enter the pores of the skin, so as to penetrate it with great effect. There is a safety valve at F, Fig. 2, through which the superabundant pressure passes off.

By this method all handling of the hides is obviated, and the process completed in a few days.

A patent on this invention was procured through the Scientific American Patent Agency on the 10th January, 1865, and application for a reissue is now pending. For further information, address Messrs. Kennedy & Elder, 205½ Walnut street, Philadelphia, Pa.

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